- APPA-TAPPI Conventions
- Hamilton Paper Co.'s new machine
- Saran-lined pipe at Nekoosa-Edwards
- New oxidized starches
- Casein and animal blood adhesives

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

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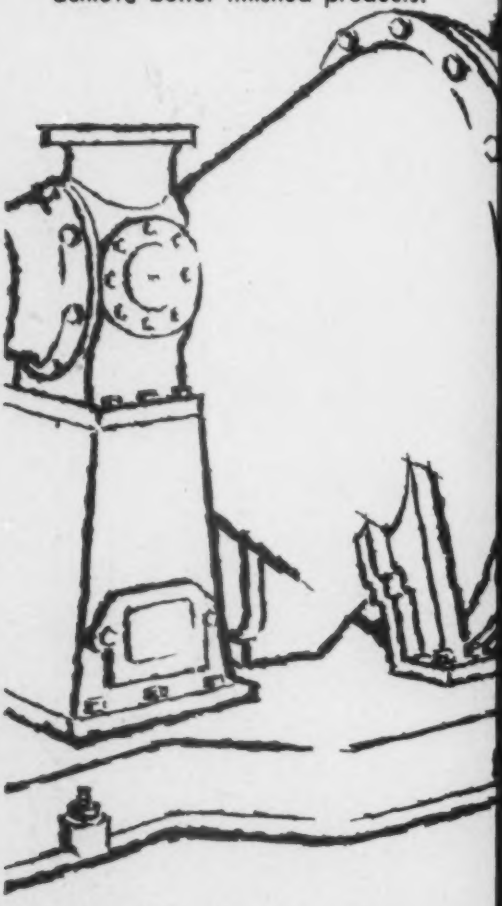

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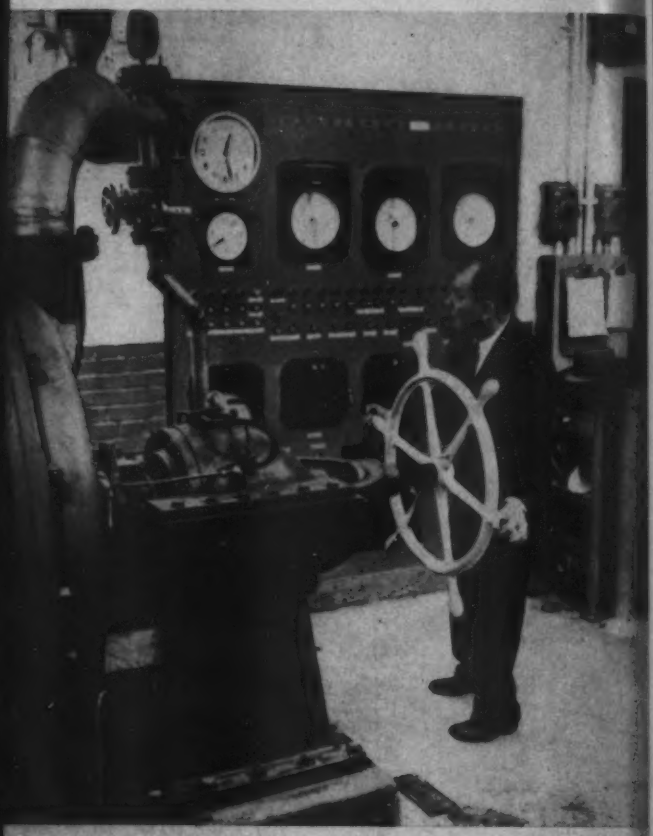

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Go into the paper mill and learn the papermaking skills that Hammermill experts use in making Hammermill Bond. Find out how to knit fibers together more tightly as Hammermill does with a special machine that beats interlocking "fingers" onto each fiber.

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2. The easy way:

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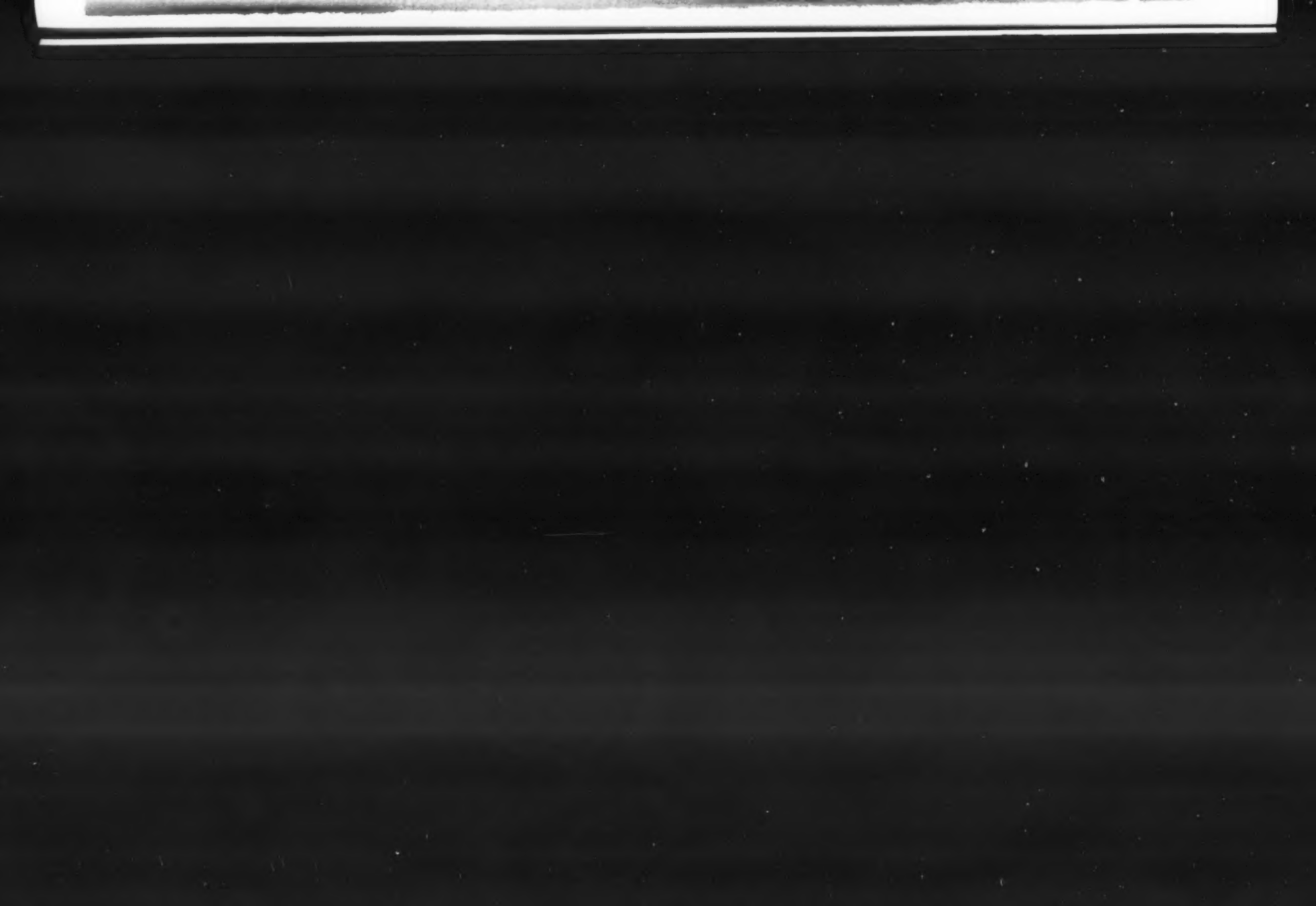


why dye alone?

Some say coloring paper is an art....

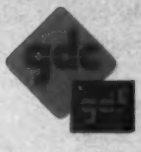
Some say coloring paper is a science....

Whatever....

It is a complex procedure dependent on a multitude of pulping and papermaking variables with further demands to correlate with end use.

Art or science, some coloring problems may seem infrangible!

If so...why not call on GDC technical service whose literally hundreds of man-years of experience with papermaking problems are freely available.



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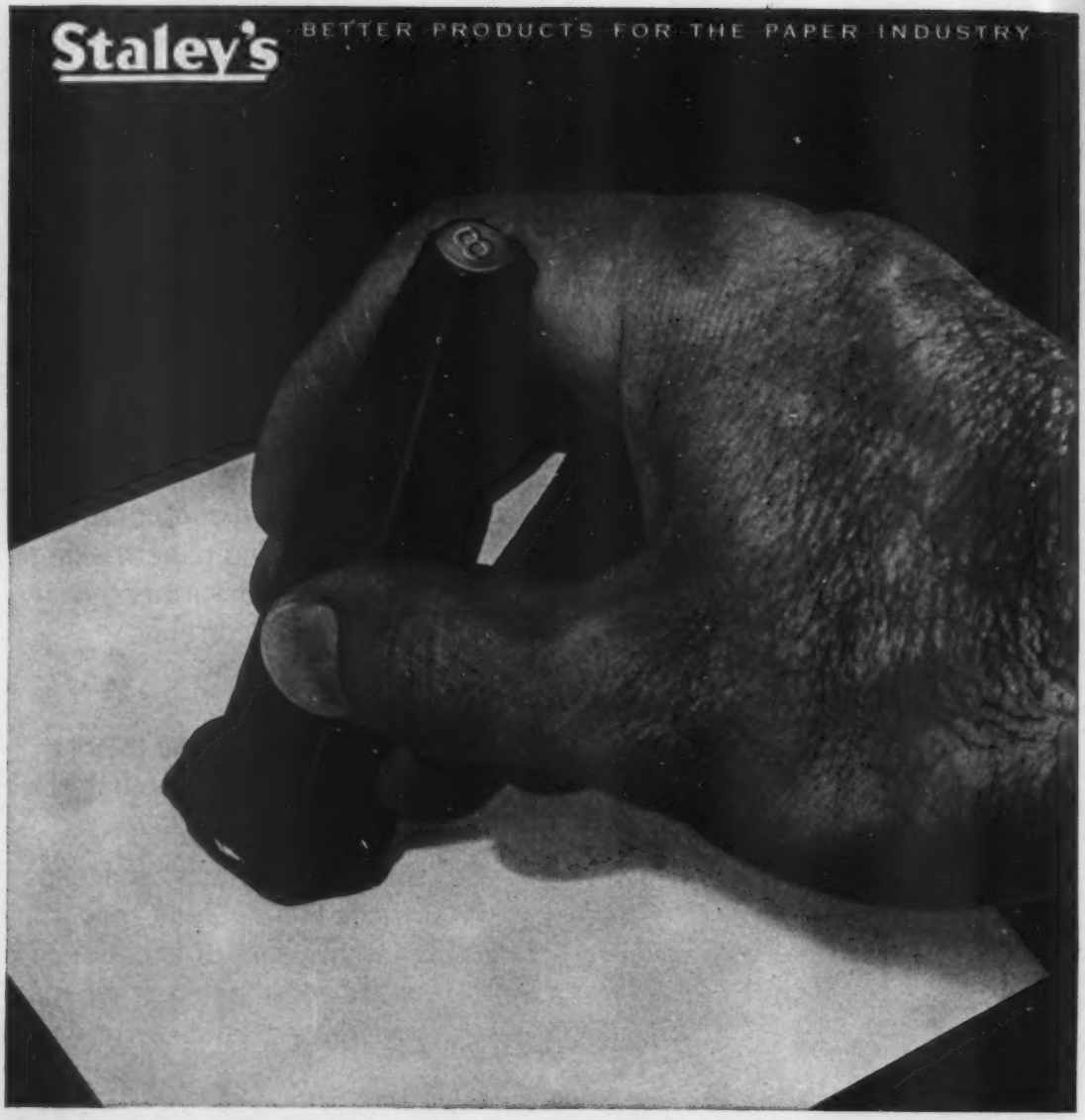

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Higher adhesive quality! Now you can use high-solids coatings of low viscosity *without sacrificing surface strength.*

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Long a standard in the paper industry, Stadex 140, like all Staley dextrins, is now made by a brand new dextrinization technique that guarantees you even better adhesives of top quality, minimum color and unparalleled uniformity.

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Features . . .

Editorial — A need for more intensive research 797

Whither? — Meteor dust — the cause of rain? — Japanese pulp mill in Alaska — Polyester fiberglass machine hood — APPA appoints public relations committee — B & W develops pressurized-furnace steam generator 866

Major expansion completed at Hamilton Paper Co.'s Miquon mill 804

Nekoosa-Edwards pioneers in chlorine dioxide bleaching and saran-lined piping 807

Adhesives in the paper industry: Part IV continued 808

New oxidized starches for the paper industry 810
by Daniel E. Lucas and Claude H. Fletcher

TAPPI holds 44th annual meeting 814

82nd annual APPA meeting 819

New process for mill waste destruction 831

Experimenting with newsprint 831

New method of sawing produces larger chips 832

Pipe, fittings, valves and pumps series will be resumed in the May issue.

News . . .

News of the Industry 831
Names in the News 839
Necrology 840

Departments . . .

Current Comments 825
Coming Events 834
Foreign Abstracts 842
Patent Reviews 846
New Products 851
New Literature 859
Market Quotations 863
Index to Advertisers 865

The PAPER INDUSTRY is indexed regularly in **Engineering Index** and **Industrial Arts Index.** An index to each volume is issued annually by the publisher as a part of the April number.

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From our point of view..

A need for more intensive research

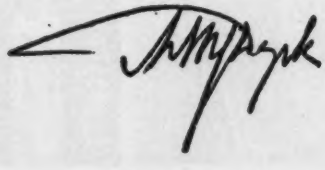
The joint TAPPI-APPA Research Forum held on the final day of Paper Week we hope will set a precedent to more such constructive joint endeavors during the annual meetings of the two associations.

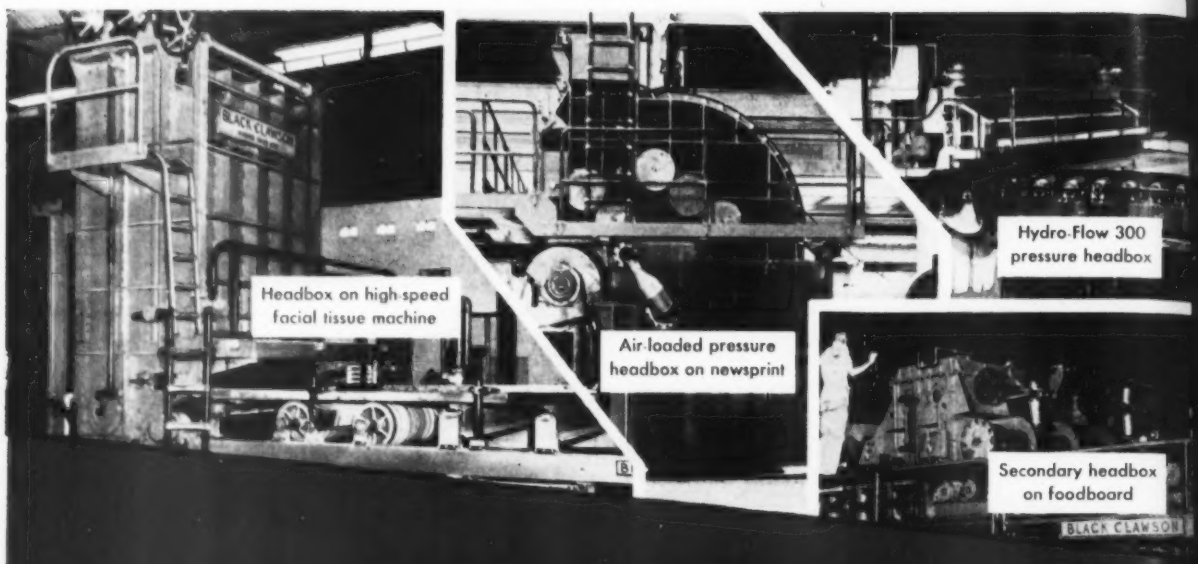
The theme of this joint symposium was appropriately selected "in an effort to alert the paper industry to the present need for more intensive research and to an improved administration of such research".

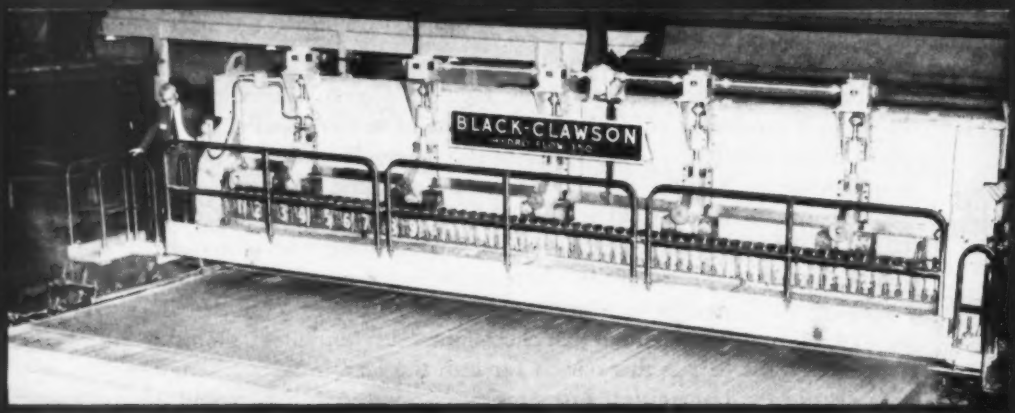
The need for more intensive research has never been greater than it is today. General J. M. Gavin's sobering remarks left no doubt that the prospects of our national survival are in direct relationship to the quantity and quality of research we as a nation are capable of undertaking and supporting.

If this relationship between our technological development and national health is as critical as pictured by General Gavin, the cost of research becomes a secondary consideration in view of the economic, technological and military challenge the USSR is posing to the Western world. The main requirement is that our research efforts be put on a priority basis and that they be organized to yield a maximum of quality results. In view of the close interdependence of all industries comprising the structure of our national economy, it cannot be overemphasized that research should become the immediate concern of every segment of our industry and in all its productive efforts. It is obvious that the minimum requirement should be a determined effort to put this nation far into the lead in science, engineering, and also in the humanities. Any program or endeavor that would limit our efforts to doing only the obvious or be satisfied with achievements that just match those of our adversaries simply is not good enough. It would only lead us from crisis to crisis and perpetually leave us on the brink of a global holocaust.

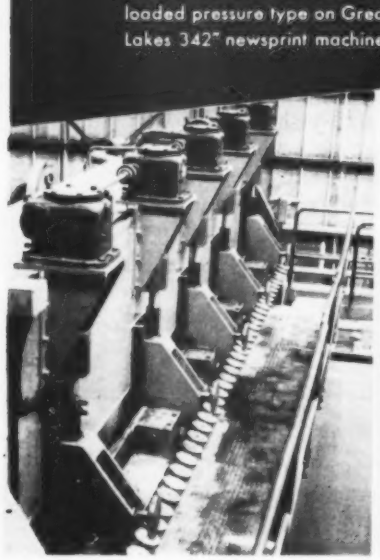
There is no doubt that winning the necessary lead in the sciences and all other branches of higher education lies well within the capacity of this nation — a nation that commands a high level of resources and resourcefulness. There also is no doubt that a wholehearted and unstinted effort by both government and industry in organizing and promoting more intensive research programs would restore public confidence in ourselves, our economy and our technology — a confidence that was severely threatened by the sudden ascendency of mankind into the space age, leaving this country at a temporary disadvantage.

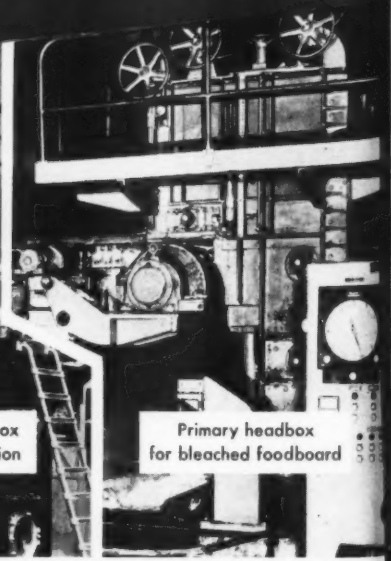



Headbox on high-speed facial tissue machine
Air-loaded pressure headbox on newsprint
Hydro-Flow 300 pressure headbox
Secondary headbox on foodboard
BLACK CLAWSON



World's largest headbox, Black-Clawson Hydro-Flow 350 air-loaded pressure type on Great Lakes 342" newsprint machine.

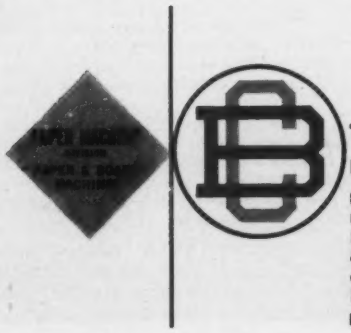




Black-Clawson ADVANCED Headbox Designs

Features of the Pressure Type Headbox

- "Hydraulically Sized" entry ports for size and speed of machine.
- Rectangular turbulence chamber to distribute flow across machine.
- Venturi to increase velocity head and level out flow.
- Machined Venturi opening.
- No obstruction in Venturi.
- Clean-out cover at front end of turbulence chamber.
- Roll in throat to kill velocity and assure cross machine distribution.
- Roll in throat adjustable vertically for proper positioning of roll.
- Swing open inspection windows tending side and dome.
- Sight glass for stock level indication.
- Head indicator.
- Two, finned type perforated rolls just before slice to assure uniform controlled flow through slice opening onto wire.
- Slice rolls adjustable horizontally for proper position with slice wall.
- All rolls supported in anti-friction bearings.
- Rolls removable from tending side.
- Enclosed motors for holey roll drives.
- Stationary lower slice lip for smooth delivery.
- Straight upper slice.
- Universally adjustable upper slice lip.
- Micro-metric warping rods on 5" centers approx.
- Self-contained stainless steel walkway and front plate.
- Synchronized vertical movement of slice wall.
- Clean, rugged hinge design tying together dome and slice wall.
- Strong—compact unit.
- A basic head box with a full line of accessories.



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. . . Fluid Power news

REPORT NO. 12,10
"ANY-SPE
WINDE
DRIVE
CUTS COS

From Oilgear Application-Engineering Files

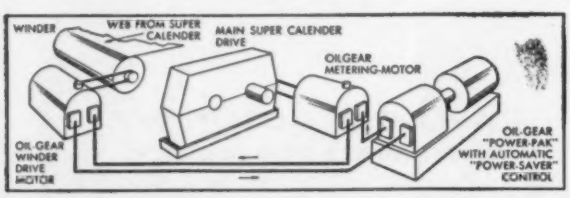
HOW OILGEAR "ANY-SPEED" WINDER DRIVE IMPROVED SUPER CALENDER PERFORMANCE AND PRODUCT QUALITY

CUSTOMER: *A Large Midwestern Paper Manufacturer*

DATA: This company had the same problem on a super calender that faces every manufacturer of a continuous sheet, strip or web that can be easily torn or broken . . . winder synchronization and tension control for top product and roll quality. *Specific job requirements*: 1: Use minimum of calender main electric drive power to prevent possibilty of overload. 2: Close tolerance "Any-Speed" synchronization between winder and calender to prevent loose winding at low speeds, "catch-up" and tearing at high speeds. 3: A minimum top operating speed of 1,000 ft/minute. 4: Dependable, trouble-free, round-the-clock performance. 5: Conserve valuable floor space. This application is a particular challenge, since other drive which provided a high top speed proved uncontrollable on starting take-off.

Photo upper **left** shows Oilgear metering-motor (1) to right, as connected with main calender drive. Winder-drive motor (2) and back panel for automatic, adjustable, winder-tension control (3) can be seen in background. Photo above shows Oilgear heavy-duty "Power-Pak" (4) installed in basement beneath super calender to conserve valuable floor space. Also shown are Oilgear winder-drive motor (2), and automatic, adjustable, winder-tension control panel (3).

SOLUTION: An Application-Engineered Oilgear "Any-Speed" Winder Drive System . . . an Oilgear heavy-duty "Power-Pak"; two series-connected, constant torque, fixed stroke, Oilgear Fluid Power motors; an Oilgear automatic, adjustable, winder tension valve. This installation easily surpassed all specified requirements, and has operated on a continuous 24-hour schedule for over 3 years with no reported major maintenance. User Reports — *this winder drive has assured consistent production of high-grade finishes, good roll quality, and reduced over-all cost of machine operation.* Due to constant, "Any-Speed" synchronization, and unvarying tension on the paper web in the super calender stacks, "break-fold" marks on soft calender rolls have been virtually eliminated — resulting in longer calender roll life. Costly roll refinishing and machine downtime are sharply reduced.



OPERATION: Oilgear Variable Displacement Pump with Automatic "Power-Saver" Control (4) supplies Fluid Power to metering-motor (1) — "tied" to main super calender drive. In this way, metering-motor (1) tends to boost main calender drive power rather than taking power from it. Starting a new roll, series-connected winder-motor (2) must run at high speed, requiring high volume at low torque (pressure). As roll diameter increases, proper web tension is maintained over a wide core-to-full-roll ratio by automatically increasing torque (pressure), and decreasing

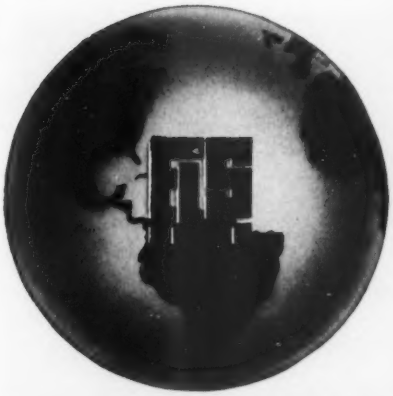
Whether you need constant or automatic tapering tension, constant or automatic tapering torque, or a combination of torque-tension characteristics . . . there's a dependable, Oilgear "Any-Speed" drive to meet your requirements.

Users in every industry claim — "for lowest-cost-per-year . . . it's Oilgear!"

For similar practical solutions to YOUR linear or rotary drive and control problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

THE OILGEAR COMPANY

Application-Engineered Controlled Motion Systems



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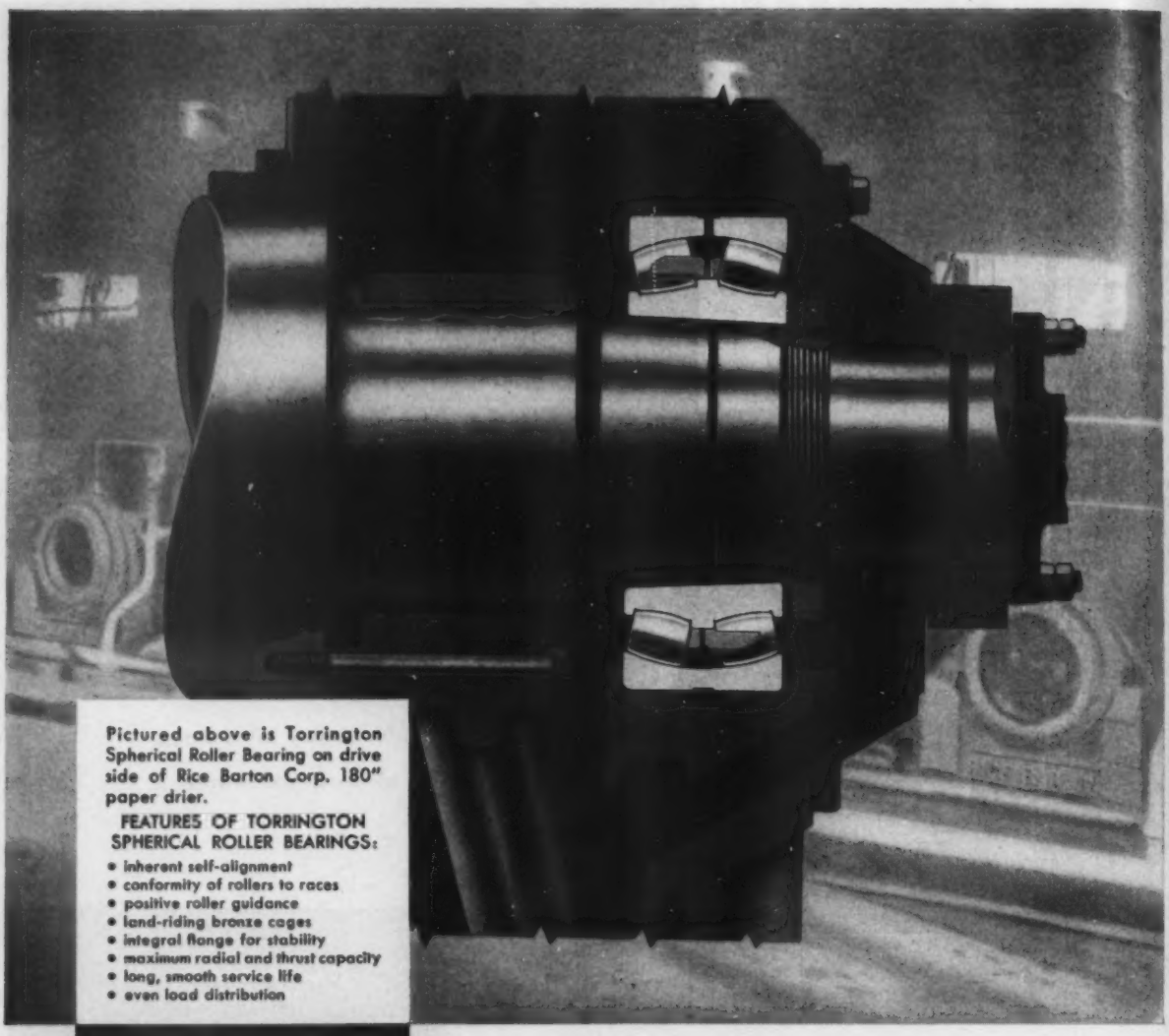
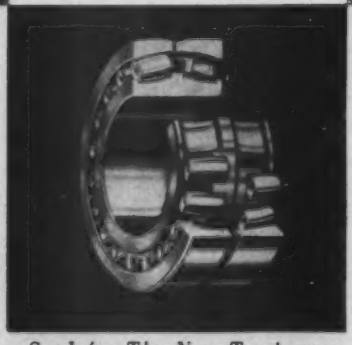


Pictured above is Torrington Spherical Roller Bearing on drive side of Rice Barton Corp. 180" paper drier.

FEATURES OF TORRINGTON SPHERICAL ROLLER BEARINGS:

- inherent self-alignment
- conformity of rollers to races
- positive roller guidance
- land-riding bronze cages
- integral flange for stability
- maximum radial and thrust capacity
- long, smooth service life
- even load distribution



Send for The New Torrington Spherical Roller Bearing Catalog No. 258.

Torrington Spherical Roller Bearings

Self-alignment + conformity + stability = *smooth drier performance*

Torrington Spherical Roller Bearings provide self-alignment across the 180"-face Rice Barton Corp. paper driers to assure Kalamazoo Paper Company smooth drier operation. They are used in drive and tending sides.

Uniform loading for both roller paths is secured by accurate geometrical conformity of races to rollers and through positive roller guidance against the integral center flange. Further assurance of long bearing life is Torrington's use of finest quality electric furnace alloy steel and the most advanced metallurgical methods.

These advantages of Torrington Spherical Roller Bearings add up to superior performance, longer bearing life and less paper machine down time. This means maximum profit for machine builder and user alike. **The Torrington Company, South Bend 21, Ind.—and Torrington, Conn.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

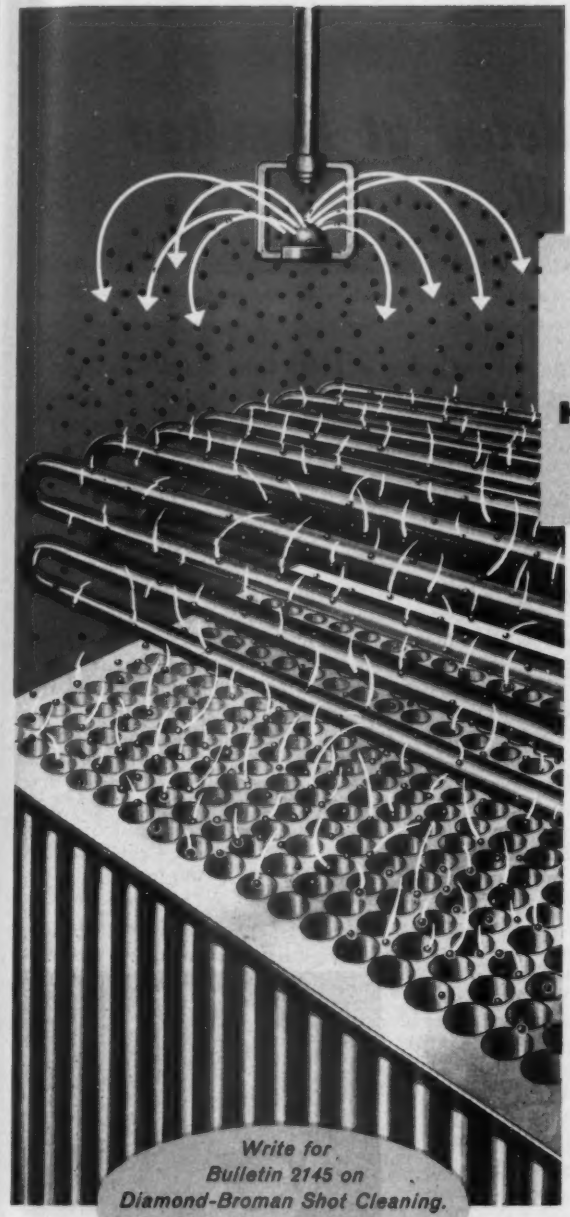
SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE • BALL • NEEDLE ROLLERS • THRUST

Diamond SHOT CLEANING SYSTEM

. . . Now Ready and Able to

IMPROVE THE CLEANING OF

TUBULAR AIR HEATERS
•
ECONOMIZERS
•
HORIZONTAL SUPERHEATERS
•
REHEATERS



Shot cascading over horizontal tubular surfaces and through vertical air heater tubes, does an excellent job of removing soot and ash deposits from difficult-to-clean surfaces and those which foul rapidly.

Shot Cleaning has proved itself in more than 30 installations in the United States and in more than 800 installations in Europe. Many installations represent exceptionally difficult cleaning problems such as tubular air heaters, economizers and superheaters in black liquor fired boilers in paper mills. In a large central station, the system is now keeping air heaters clean which previously had to be water washed approximately every eight months, each washing requiring a three day boiler outage. With Diamond Shot Cleaning, draft losses are uniformly low and water washing has been eliminated entirely.

Shot is spread by distributors and cascades over tube surfaces ricocheting from tube to tube, or from side to side of internal surfaces of vertical air heater tubes. Much of the ash removed is carried off by flue gas. Heavier particles fall into the shot hopper and recirculate with the shot until broken fine enough to pass out with the gases. Shot accumulated in the hopper is lifted pneumatically to the storage area and reused continuously. Areas which foul rapidly can be kept completely clean by increasing the length of the shot cycle (it can be continuous) without disturbing boiler operation.

Over a period of years Diamond has conducted extensive research in shot cleaning, as a part of our half century policy of providing the best in boiler cleaning. To supplement this program, Diamond acquired U.S. rights to the Broman-Ekstrom system used in Europe.

Write for Bulletin 2145 on Diamond-Broman Shot Cleaning.
Diamond gives you better boiler cleaning at lower cost.

Diamond

DIAMOND POWER SPECIALTY CORP.
LANCASTER, OHIO

8263

Major expansion completed at Hamilton Paper Co.'s Miquon mill

The new equipment includes a 1200 fpm Black-Clawson paper machine, a 70,000 lb./hr. Union Boiler steam generator, a 122-in. Langston slitter-winder, and Nash conical vacuum pumps.

THE $4,500,000 expansion program (started about two years ago) was recently completed at Hamilton Paper's Miquon mill with the installation of No. 8 paper machine. Hamilton Paper Co. is the largest manufacturer of text and cover papers in America, as well as an important producer of business, offset, book and specialty papers. The business paper line includes Bond, Ledger, Mimeograph and Duplicator papers.

The 1200 fpm paper machine, designed for a daily production of 80 tons of high quality papers, was christened "Hugo" in tribute to Mr. Hugo H. Hanson, chairman of the board, in recognition of his progressive leadership.

The machine was installed in record time on a fixed fee basis with a guaranteed maximum cost by a group of four contractors. The contractors involved are: (1) Baton Construction Corp., general contractor; Riggs-Distler Co. Inc., electrical contractor; Nelson & Co., piping and instrumentation contractor; and George Young Co., rigging contractor.

These contractors worked in close cooperation with James L. Graual, chief engineer; John W. McAllister, director of power maintenance and construction; Richard Borkowski, electrical engineer; and Arthur Alcombrack, maintenance superintendent, of Hamilton Paper Co.; and George Mercer, erection engineer of Black-Clawson Co.

Stock preparation

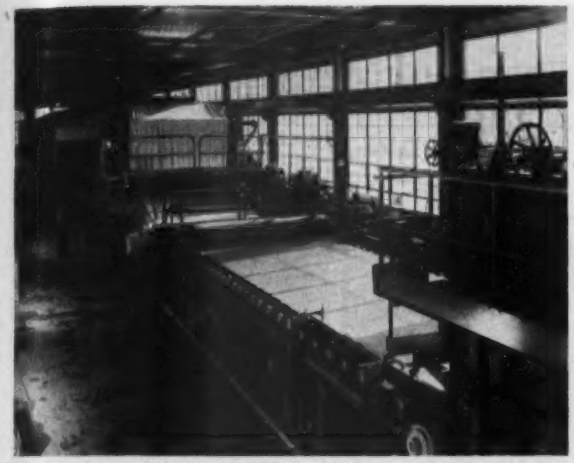
The expansion program also called for an additional stock preparation system consisting of a 16-ft. type HR batch 250 hp Hydrapulper; a 54-in. dia. propeller agitator, ten 16-in. valves and static stock spreader for the blending chest; two No. 6 Hydrafiners and two No. 2 Duotrols; a vertical agitator for the vertical dump chest; a 5-in. Class DVS vertical pump and a 12-in. cylinder-operated slide valve; an open type consistency regulator equipped with stuff gate to control consistency and volume of the stock immediately ahead of the paper machine; two No. 2-A jordans; a 12-in. Class HMSS fan pump; and two 50 psi Selectifier screens.

The broke chest is equipped with a rotary valve, vertical agitator, gear reducer, 6-in. pump and a 10-in. slide valve.

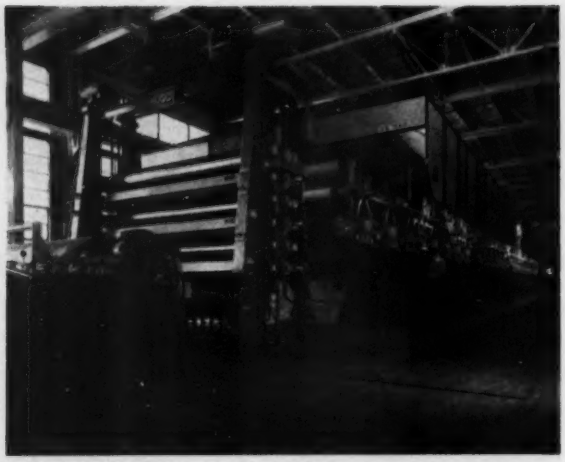
Prior to entering the headbox, stock passes through seven Centri-Cleaners —five No. 623, 500 gpm units ar-

Lane Taylor, President

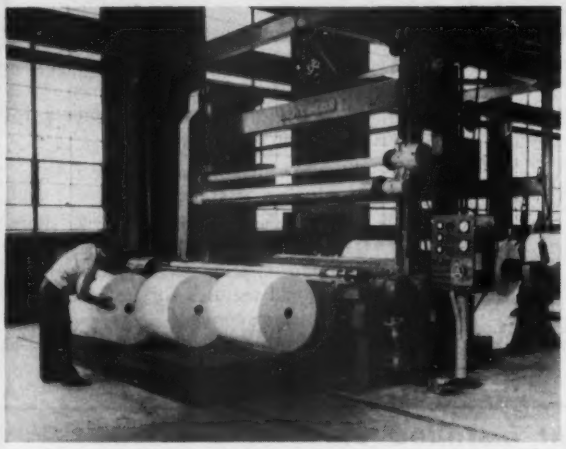
Hugo H. Hanson, Board Chairman



Black-Clawson 126-inch non-cantilever type fourdrinier and press section.



Black-Clawson calender stack and dryer section with 61 dryers.



Langston 122-inch slitter winder equipped with automatic air brake.

Seybold 100-inch trimmer equipped with back-feed and conveyors.

ranged in the primary stage, one No. 623 unit in the secondary stage, and one No. 606- 6-in., 90 gpm unit in the tertiary stage.

The paper machine

The non-cantilever type fourdrinier is equipped with an open type headbox, a 126-in. wide wire, a 20-in. dia. bronze breast roll, 24 rubber-covered 8-in. dia. table rolls, 6 rubber-covered wire rolls, 4 suction boxes, one Rotabelt, one scavenger box, a 32-in. dia. suction couch roll with 8-in. wide suction box, a 20-in. dia. dandy roll, and two Simplex type shake units equipped with 5 hp. motor and P.I.V. drive.

The dandy roll, with cradle roll stands, is equipped with quick lift arrangement and electric drive.

Four 8-in. suction boxes are made of stainless steel, two suction boxes have 10-in. wide Ryertex slotted covers, and two have 10-in. wide end grain maple covers. These are followed by a Rotobelt and a scavenger box.

Vacuum for the suction boxes and suction rolls is provided by 5 vacuum pumps, including two H-9, two K-4, and one H-11T. conical vacuum pumps.

The press section consists of three presses: the first is a straight through press, the second a reverse press and the third a smooth press.

The first press has a 26-in. dia. rubber-covered suction bottom roll and a 22-in. dia. granite top roll. The second press has a rubber-covered bottom roll and a bronze shell on cast iron center top roll; both are 22 in. in diameter. The smooth press with a nip pressure of 150 lbs. has 22-in. dia. top and bottom rolls, the bottom roll being a bronze shell and cast iron center and the top roll is rubber-covered.

The presses are equipped with air cylinders for lifting and loading. Two newest Model Vickery felt conditioners—one on the first press felt and one on the second press felt—are of the self-contained traveling header design equipped with hydraulic drives. A motor-driven broke conveyor operates from the first press.

The 53 paper dryers and 8 felt dryers (all 48-in. dia.) are arranged in three sections: the first section has 20 paper dryers, two regular felt dryers and two Feney felt dryers; the second section has 20 paper dryers and two regular felt dryers; and the third section has 13 paper dryers and two regular felt dryers.

The dryers are designed for 75 psi steam pressure. The two dryers following the size press, which is located between the second and third sections, are Monel-cased. All dryers are carried on anti-friction bearings. Eight dryers are equipped with

Lodding doctors, all of which are equipped with fuzz collectors.

The size press has two 22-in. dia. rubber-covered rolls and is equipped with showers and a 316 stainless steel pan. The top roll is driven from the indrive shaft through a P.I.V. drive with V-belt connection to the drive shaft.

Between the size press and the third dryer section are two Vari-Bow rolls to remove the wrinkles from the sheet as it comes off the size press. These 6¼-in. dia. rolls feature a hydraulic bowing device so that the amount of bow, as well as the angle of bow, can be adjusted while running.

The third dryer section is followed by a 7-roll calender stack equipped with electric lift and pneumatic loading. The bottom roll is 24-in. dia., the top roll 16-in., and the three intermediate rolls are 12-in. dia. Calender rolls are equipped with Vickery High-Flex doctors.

Following the calender are: a 36-in. horizontal Autoflyte reel equipped with water-cooled drum, an unwinder complete with Horton brake, and a slitter and winder with motor generator set drive.

The type DA slitter-winder is 122 in. wide and driven with V-belt drives by a variable-speed dc motor. It is designed to slit and wind rolls of any diameter up to 60 in. at speeds up to 3000 fpm. The winder is equipped with an automatic air brake which also maintains accurate tension control of the sheet.

The 60,000 lb./hr. automatic Union boiler replaces two coal-fired semi-automatic stoker units.

The paper machine is driven by a steam turbine through a line shaft, pulleys, and a number of completely enclosed spiral bevel gear drive units which drive the suction couch, suction press, second press, smooth press, three dryer sections, size press, calenders and reel. All drive units are equipped with Fawick air clutches featuring inching arrangements for all dryer sections.

Steam control and dryer drainage system

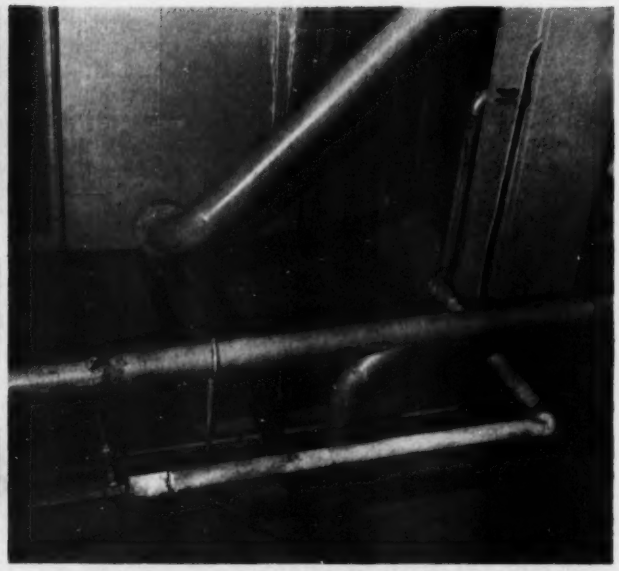
The steam control and dryer drainage system includes a standard blow through system, while incorporating additional features for added flexibility in drying control.

(Continued on page 835)

Principal equipment installed at Hamilton Paper Co.'s Miquon mill

Air supply and exhaust system, including hood exhaust fans, and roof supply systems	J. O. Ross Engineering Co.
Agitator, 54-in. dia., propeller type, for blending chest; a vertical agitator for dump chest	Black-Clawson Co.
Calendar stack, equipped with electric lift and pneumatic loading	Black-Clawson Co.
Calender doctors, Vickery High-Flex	Bird Machine Co.
Belts, Extra-Multus, on paper machine drive	Extremultus Inc.
Centri-Cleaners (7), six No. 623, 500 gpm units; one No. 606, 90 gpm units	Bauer Bros. Co.
Condensation pump, S-1230, single condensation	Nash Engineering Co.
Consistency regulators, including an open type equipped with stuff gate	De Zurik Corp.
Dryers (61), 53 paper dryers and 8 felt dryers, 48-in. dia. each	Black-Clawson Co.
Duotrols (2), No. 2	Black-Clawson Co.
Fan pump, Class 12 HMSS, 12-in.	Black-Clawson Co.
Felt conditioners (2), Vickery, of the self-contained traveling header design	Bird Machine Co.
Fourdrinier, non-cantilever type, 126-in. wire, equipped with 8 suction boxes, 32-in. dia. suction couch, 24 rubber-covered table rolls	Black-Clawson Co.
Headbox, open type with adjustable curved-lip slice	Black-Clawson Co.
Hydrafiners (2), No. 6	Black-Clawson Co.
Hydrapulper, 16-ft. type H R, 250 hp	Black-Clawson Co.
Instruments, one 2-pen pressure gauge, and one 16-point Electronik potentiometer, strip chart recording type, for boiler control	Minneapolis-Honeywell Regulator Co.
Instruments	Foxboro Co.
	Taylor Instrument Co.
Jordans (2), Miami No. 2-A	Black-Clawson Co.
Lubricating system	Bowser Inc.
Moisture control system	Stamm Drying Controls Inc.
Paper machine drive, pulleys, lineshaft and enclosed spiral bevel gear drive units	Black-Clawson Co.
Presses (3), a straight through, a reverse and a smooth press	Black-Clawson Co.
Reel, Autoflyte, 36-in. horizontal, equipped with water-cooled drum	Black-Clawson Co.
Selectifier screens (2), Miami, 50 psi, equipped with automatic slide valve and control panel	Black-Clawson Co.
Size press, 22-in. dia. rubber-covered rolls, equipped with showers and 36 stainless steel pan	Black-Clawson Co.
Slitter-winder, 122-in. wide, equipped with automatic air brake	Samuel M. Langston Co.
Steam generating boiler, 60,00 lb./hr. capacity, oil-fired	Union Boiler & Mfg. Co.
Steam turbine	Westinghouse Electric Corp.
Steam control and dryer drainage system	Stamm Drying Controls Inc.
Suction box system	Clarke-Vicario
Trimmer, 100-in., equipped with back feed and conveyors	Harris-Seybold Co.
Unwinder, complete with Horton brake	Black-Clawson Co.
Vacuum pumps (6), two H-9, two K-4, one H-11T and one K-5 conical pumps	Nash Engineering Co.
Vari-Bow rolls, 6¼-in. rolls equipped with hydraulic bowing device	Mount Hope Machinery Co.

Saran-lined piping is used to transport waste liquor to storage tank as well as for connection between two ClO_2 reactors.



Two-inch saran-lined pipe leads into dissolving tank and carries a liquid that contains 450 grams of sulfuric acid per liter.

Nekoosa-Edwards pioneers in chlorine dioxide bleaching and saran-lined piping

A total of 750 ft. of acid resistant and improved type saran-lined 2-inch piping carries liquor to storage and dissolving tanks.

NEKOOSA-EDWARDS Paper Company is known for its pioneering spirit ever since it built the first paper mill on the Wisconsin River.

Recent proof of the company's progressive outlook is that Nekoosa-Edwards' chlorine dioxide stage in pulp bleaching is the first such operation installed in Wisconsin and that a saran-lined steel piping system is used for transporting heavy concentrations of acid from the chlorine dioxide reactors to a waste liquor storage tank and a dissolving tank.

Most of the liquor's value stems from the fact that it consists of sodium bisulfate dissolved in a 450 gram per liter sulfuric acid. Both acid and bisulfate are converted to sulfate by reacting with the alkaline kraft green liquor in the smelt dissolving tank of the kraft recovery system. This contributes both sulfur and sodium to the kraft liquor cycle.

Requirements of the piping system

The storage and dissolving tanks are of necessity located several hundred feet from the two reactors that produce the bleach. As a result, several considerations were especially important in selecting the proper carrier for the waste liquor:

1. The waste liquor pump operates in three shifts. The liquid leaves the reactors at a temperature of 140° F., but can quickly cool to the atmospheric temperature at various points along its route. If the atmospheric temperature is at or below zero, thermal shock can disrupt many types of piping systems. Needed, then, was a carrier that could withstand abrupt and sizable thermal changes.

2. To keep installation costs to a minimum, piping was desired that would need nothing more than the normal support of a steel pipe. An all-plastic piping system, for example, would require a continuous support system.

3. The carrier had to be resistant to the corrosive effects of the heavy acid content of the waste liquor. Thus, an all-steel system would not do.

4. Since the piping was to travel

(Continued on page 837)

Adhesives in the paper industry

Part IV (Cont.) — Casein and animal blood adhesives

▶ Casein glues have excellent high and low temperature resistance. About 53,000,000 lbs. of casein are used annually in paper coating.

THE CASEIN glues (8), like the liquefied animal glues, are used for sealing labels to beverage bottles which must be immersed in cold water. They are also used for case-sealing, for tin labelling and for labelling over ink and varnish. Their water resistance may vary from moderate to excellent, although their alkali resistance is poor. This latter property makes them valuable for bottle labelling where the labels are subsequently removed with an alkaline wash. Casein films are strong and usually provide better adhesion to plastic, inked or varnished surfaces than do vegetable or animal glues. Casein is, of course, an important constituent of paper coatings where its adhesive function makes it valuable.

Casein is available as a granular substance with a particle size varying from 30-100 mesh. Casein solutions are also available where the glue is desired in its final form.

Lodge (8) points out that casein is suitable for lamination of wood because of its gap-filling properties, its fire resistance, its ability to cure at low temperatures, its ease of application and its durability during normal protected exposures. In the label industry, casein is appreciated because of its good application properties which accounted for the important initial use of casein as a wood-to-wood adhesive. In addition, casein may be used for gluing wood and paper to plastics, films, foils and metals.

Casein glues have excellent high and low temperature resistance but lose their strength under conditions of high humidity, due to breakdown of the protein bonds or to destruction of the casein by bacteria. Under normal interior conditions, however, casein bonds will last indefinitely. Casein glues are normally formulated with mold inhibitors and bactericides in order to render them more resistant to micro-organisms.

Casein adhesives are formulated with alkali, or other peptizing agents, which is necessary in order to obtain proper dispersion. Thus, a typical simple formulation might consist of 100 gr. of casein and 8 gr. of sodium hydroxide with 300 gr. of water. Ammonium hydroxide may, of course, be used instead of sodium hydroxide. Lime is also an adequate dispersing agent.

Casein may also be combined with natural and synthetic rubber emulsions and with various resins. It also serves to improve the mechanical stability of synthetic latices.

The use of casein in paper coatings provides the largest single outlet for this protein. Here, casein serves as the adhesive or the binder for the other constituents of the paper coating, which include clay, calcium carbonate, titanium dioxide and a variety of other pigments. The casein is used at a level of 12-15 parts per 100 parts of pigment in order to provide proper adhesion. Casein improves the gloss and the printing properties of paper.

An important adhesive use of casein is in the so-called ice-water proof label glues used on beer and soft drink bottles. Here, the glue is formulated to adhere in ice water so that the label is not removed when the bottle is stored in a cooler. At the same time, the label comes off readily when washed with caustic soda.

New cold-water soluble casein

The manufacture of four new cold-water soluble caseins was recently announced.

Unlike most conventional caseins, which, after soaking and the addition of alkali, require up to 60 min. of heating at from 130° to 18° F., the new products require only 10 min. of alkali soaking and about 30 min. of mixing at only 60° to 80°F. The rate of solution can be increased by use of a high-speed mixer. High-speed mixing presents no foaming problems, it is reported. And use of products eliminates the need for cooking equipment.

The four new caseins were designed for use in paper coatings, paints, inks, adhesives, leather and textile finishing, wax and asphalt emulsions, and as latex stabilizers and thickeners.

The chemistry and manufacture of casein

Casein, the chief protein in milk and cheese, is hygroscopic and water dispersible. It contains about 20 amino acids which include glutamic acid, proline, valine, serine, leucine, isoleucine, lysine and tyrosine as the major constituents. Because it contains phosphorus also, it is known as phosphoprotein, although the phosphorus content is at the low level of 0.71-0.85 per cent. There is also present in casein, 0.76 per cent organic sulfur. The molecular weight of casein ranges from 75,000-375,000. Accordingly, various fractions can be isolated and at least four have been identified and are known as alpha, beta, gamma and delta casein, respectively. From this

point of view, then, casein may be considered as a mixture of at least four closely-related proteins.

Casein is amphoteric and has an isoelectric point at a pH of 4.6. It reacts with formaldehyde to form a very insoluble compound. Actually, casein-formaldehyde condensates were among the first plastics and were used for the molding of billiard balls.

Consumption of casein in the United States is of the order of 75 million pounds per year of which about 70 per cent is used for the coating of paper and 25 per cent for glues, paints and plastics.

Commercially, casein is obtained from skim milk (2). The process, briefly, is one of selective precipitation, removal of the whey, washing, drying, and grinding of the protein. These operations may be performed batchwise, continuously or by a combination of batch and continuous operations. The precipitation of the casein from skimmed milk is accomplished by the addition of acid at a pH of 4.1-5.5. Although the isoelectric point of 4.6 would give the largest yield theoretically, there is usually some variation from this isoelectric point in order to improve handling properties. The normal temperature range used is 34-46°C. and depends in part on the exact pH of precipitation. Usually, a lower pH of precipitation tends to give a finer particle size. Similarly, if the pH is held constant, a lower temperature tends to give a finer particle size. The precipitation is best carried out continuously, although batch processes are used. In the latter instance, local overheating and local concentration of the acid must be avoided.

The precipitating acids may be either hydrochloric, sulfuric or lactic at concentrations of 2.5-10 per cent. If lactic acid is used, it is usually prepared by allowing whey to sour until titration indicates an acidity of 1.5 per cent. The whey may be soured *in situ* in skim milk, and lactobacillus may be added to facilitate the fermentation.

A variation of normal casein is rennet casein. This is made by using a cheese-making enzyme, rennet, as the precipitating agent.

After the precipitation step, the casein curd is separated from the remainder of the whey liquor. It contains about 25 per cent solids at this point. It is washed to remove acids, milk, sugar, salts and, again, the washing may be either batch or continuous.

After washing is completed, the curd is pressed to remove excess water. Screw presses were originally used, but efficient roll presses are now available. At this point, the curd contains 55-65 per cent moisture. The whey, incidentally, is normally processed to obtain lactic acid. In the next step of the operation, the casein curd is dried until the moisture content is reduced to eight per cent. Several methods of drying are used—a popular one being a tunnel dryer with stacks of trays. The grinding of the dried product, which now has eight per cent of moisture, can be carried out either in a roll crusher or a hammer mill. Most commercial caseins are approximately 80-84 per cent pure casein. In addition to moisture, there is ash which is largely calcium phosphate, lactose and fat.

Fish glue

Fish glues provide the basis for household and commercial liquid glues. There are two types of fish glues known as isinglass or fish gelatin and cold liquid glue respectively. Isinglass, which is practically pure collagen, is obtained from the bladders of the sturgeon and related fish. Because of its high price, it is normally not used as an adhesive except when mixed with cheaper materials. It does find use, however, as a protective colloid for the clarification of various beverages. Cold liquid fish glue is less expensive than isinglass and is obtained from the heads, skins, and skeletal waste of cod, haddock, hake and pollock. (2).

Fish glue is manufactured very much like hide glue, as described previously. The raw material is first washed to remove blood, dirt and salt. The washed stock is then extracted by cooking with hot water in open kettles or under pressure. The remainder of the process is essentially the same as for hide glue.

Animal blood and industrial uses

Animal blood has an important, high-volume usage in industrial adhesives, primarily for the plywood and lumber industry in the Western United States and Northern Europe. Blood is collected from the killing floors and processed in three main ways. The largest volume is dried in rotary dryers to produce an insoluble fertilizer or feed grade material, a small proportion of which is used as a filler in plywood adhesives. A large volume of animal blood is also spray-dried to produce a high quality, water soluble, whole blood which is primarily used as a component in plywood adhesives, while a smaller volume is used in the new adhesives for paper facing veneer and lumber for packaging and sheathing uses.

A relatively smaller quantity of animal blood is processed to separate the serum from the red blood cells after defibrinating by centrifuging. The straw colored serum is spray-dried to give a light colored powdered albumen. This high priced albumen finds a specialty use in adhesive formulations for bottle cap linings and other outlets which require a light colored protein with the curing properties of animal blood.

Spray-dried whole blood is the cheapest source of practically pure soluble protein; it is cheaper than casein and competitive in price on a protein basis with soy flour which is used in somewhat greater volume as an industrial adhesive component, again, primarily for the plywood industry. Typical plywood adhesives in America are formulated from blood and soy flour blends and find a large market for interior plywood adhesives. A particularly high quality, resistant glue is produced from coagulated soluble animal blood without soy flour and reinforced with a phenolic resin. In Finland a large volume of plywood is manufactured using glues based on blood and casein blends. All of these blood glue powders are mixed in water with the addition of alkaline chemicals such as caustic and lime.

Blood glues are significantly cheaper than synthetic resin glues and possess the characteristics of rapid cure at lower temperatures and shorter press times than the phenolic resin adhesives used for plywood. They have superior water resistance to the competitively priced soy glues and are more resistant to attack by microorganisms, apart from their fast bonding characteristics. Blood glues without soy flour and reinforced with phenolic resins give a highly resistant glue line, with properties intermediate between the equivalently priced non-reinforced protein glues and the higher cost exterior grade phenolic resin glues. This type of resin-reinforced blood glue has a very high degree of water and mold resistance. There are also cold setting blood glues the use of which is increasing rapidly in plywood applications.

Western industry within the last few years has developed new products to utilize more fully relatively low grades of lumber or veneer. Two products which have found good market acceptance are veneer panels and lumber panels faced on both sides with kraft linerboard.

Paper faced veneer panels have

(Continued on page 837)

New oxidized starches for the paper industry

DANIEL E. LUCAS and CLAUDE H. FLETCHER

Corn Products Co.

▶ A new and improved series of oxidized starches has been developed. These starches — obtained through uniform processing conditions and product quality control — show improved film-forming and viscosity characteristics.

OXIDIZED STARCHES are recognized as staples in paper manufacturing, and are used for surface sizing, as coating adhesives and as wet end additives. While their function in these applications is the same as that of other types of starch, the oxidized, or chlorinated, starches have always been preferred for top-quality operations.

The fine writing paper producing mills apply the starch from the size press to tie down loose surface fibers and to improve printing and writing ink acceptance. The amount of solids, viscosity and pickup will vary with the type and weight of paper, the paper machine, and also the machine speeds.

Producers of paperboard, corrugated liner or other heavy weight sheet apply the starch at the calender stack water box. The resultant increased pick and smoother finish enable the converted-paper manufacturer to obtain clear, sharp printing; increase the organic solvent holdout during color coating and decrease board discoloration through hot wax penetration.

The oxidized starches are also used in the clay coating of paper and paperboard to obtain uniform printing surfaces with high brightness. Corn starches have high inherent binding power and have been adopted by the paper industry because of this factor. Modifications are necessary, however, to obtain a lower viscosity as well as higher total solids of coating colors.

In recent years considerable emphasis has been placed on the development of such starch derivatives as the hydroxyethyl, cationic and acetate ester modifications. All of this effort has been directed at improved performance over conventionally modified starches, particularly with respect to film-forming, adhesive and non-congealing properties.

New series of oxidized starches

Corn Products, in working with the starch derivatives, has not forgotten the traditional oxidized starches. A program of investigation of chlorinated starch performance and manufacturing techniques has resulted in a new and improved series of oxidized starches. These products are now identified with the Claro brand, and

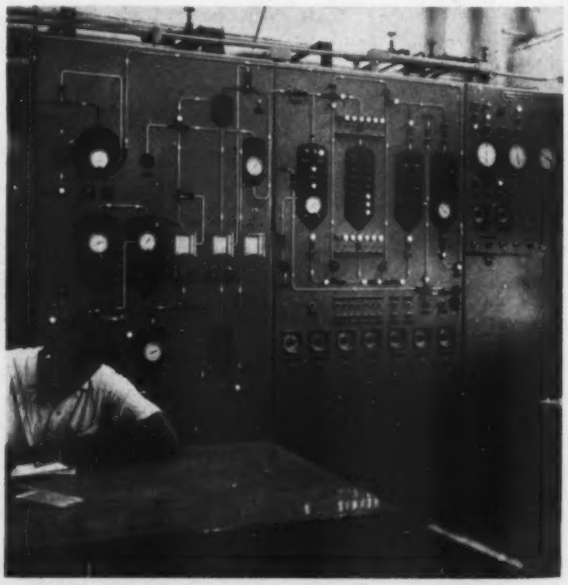


Fig. 1. Control panel used in making new oxidized starches at Corn Products' Argo, Illinois, plant.

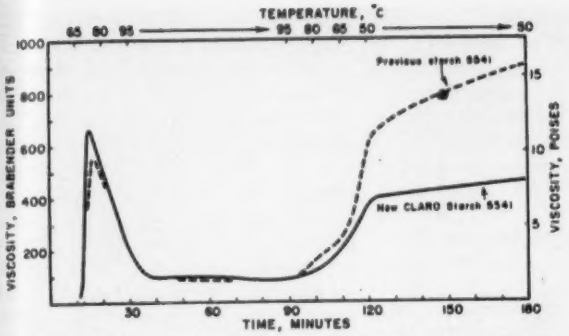


Fig. 2 — Brabender curves of Claro starch 5541 and comparable previous oxidized starch, at concentration of 80 grams per 500 ml of slurry.

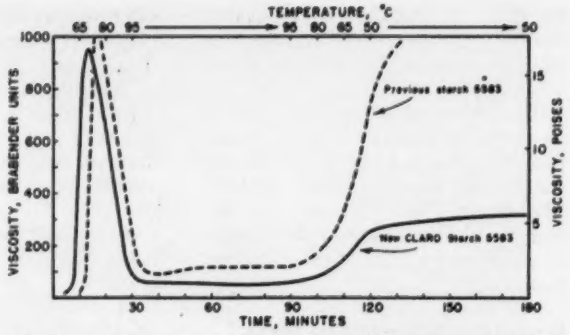


Fig. 3 — Brabender curves of Claro starch 5583 and previous product, at concentration of 140 grams per 500 ml.

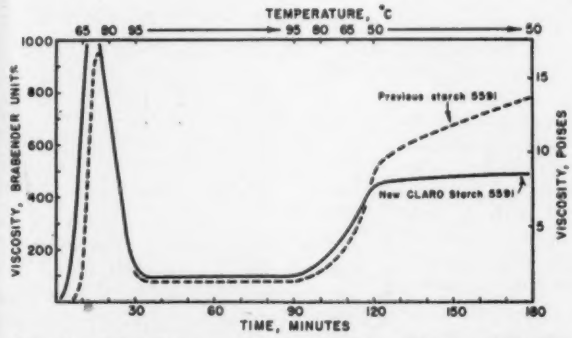


Fig. 4 — Brabender curves of Claro starch 5591 and previous product, at concentration of 175 grams per 500 ml.

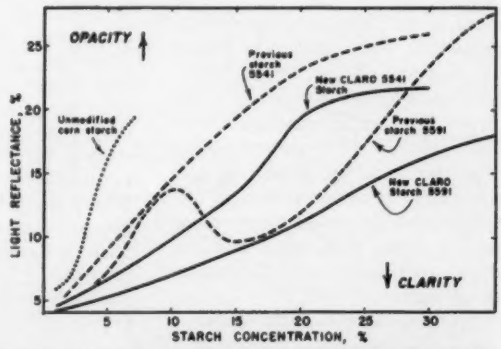


Fig. 5 — Paste reflectance of various Claro starches (solid lines) compared with analogous previous products (dashed lines).

are significantly different from the chlorinated starches formerly manufactured. Improved oxidation has been achieved, with no sacrifice of viscosity and strength properties. Trade acceptance during the past year has confirmed the value of the development emphasis on these starches.

Any starch modification must have a purpose, and the purpose of oxidation is primarily to achieve an improvement in film-forming and viscosity characteristics of regular thick boiling starch. While oxidation with alkaline hypochlorite has long been an effective means of reducing the normal congealing tendency of corn starch, the problem of attaining optimal oxidation commensurate with desirable viscosity levels has always been with us. The oxidation should be as uniform as possible, so that every starch molecule is modified to the same desired degree. If some of the starch is over-oxidized and some under-oxidized, the resulting product may have the desired viscosity but will show undesirable setback, poor clarity and impaired film properties.

Hypochlorite oxidation, to the extent necessary for practical advantage to the paper industry, is always accompanied by a thinning reaction or viscosity reduction. Most users, and most manufacturers as well, think of the various available grades of oxidized starches in terms of the viscosity differences between them.

This distinction certainly depends on one's point of view: the papermaker using the starch at the size press or calender stack is concerned with a low-viscosity, low-solids system which will improve printability, erasure properties and other surface qualities of his finished product. His evaluation of a starch is considerably different from that of the coating operator dealing with a much higher viscosity and higher solids mixture, and is using the starch primarily because of its adhesive properties.

In both instances, exactly the same oxidized starch can be used effectively. The starch manufacturer is fortunate that the oxidation reaction allows him to prepare products that will meet the requirements of many types of users.

However, the starch manufacturer must carefully control, and measure, the dual reaction of oxidation and viscosity reduction and understand its importance, if he is to succeed in meeting the diverse demands on his products.

Manufacturing techniques

The manufacturing techniques employed in Corn Products' improved process are based on uniformity of processing conditions and finished product quality control. Sodium hypochlorite is added automatically to regular starch produced by the latest of wet milling processes. Since the composition of the oxidizing agent is of great importance to the reaction, this composition is rigidly controlled both with respect to chlorine content and excess alkalinity.

The amount of hypochlorite used is dependent on the viscosity desired in the finished product, with the lower viscosity starches, like Claro Starch 5592, requiring significantly greater chemical treatment than the thicker oxidized grades, like Claro Starch 5541.

When the reaction of starch and hypochlorite has terminated, the system is neutralized, thoroughly washed and dried. In addition to the

viscosity measurements for quality control, a carboxyl determination is made to insure the effectiveness of the oxidation.

This analytical technique is based on the transformation of some of the hydroxyl groups, so prominent in the starch molecule, to carboxyl groups. The analysis for carboxyl can be paired with the viscosity measurement to assure effectiveness of the oxidation treatment.

Properties imparted by these techniques

The most important effect of maximum oxidation for a given viscosity is in the setback or gelling tendencies of the starch. This property is of extreme importance in paper coating formulations where viscosity stability affects the application of the coating color and its uniformity; in surface sizing of paper, the higher oxidation level means improved film-forming ability and greater binding power to the base stock. In adhesive formulas, improved setback properties mean more stable adhesives with more efficient adhesive application and frequently lower use costs.

In addition to viscosity, gelatinization temperatures and paste transparency are also affected by oxidation levels, and will be noticeable more in the preparation of the starch pastes than in the application of the finished product. The lowered gelatinization temperature and increased paste clarity are both indicative of more uniform and more effective modification of the starch molecule; a paste of high clarity represents maximum dispersion of the starch and the absence of insoluble particles. Such a paste will give a smooth, clear film, having optimum continuity and tenacity.

Probably of greatest significance in the achievement of higher oxidation levels is the fact that this is accomplished without extensive deterioration of the starch with respect to viscosity. Changes in starch behavior are much easier to achieve if there is no concern as to the viscosity of the finished starch, for greater modification is usually accompanied by greater viscosity and strength loss. The fact that improved oxidation has been achieved in the Claro line, with no sacrifice of viscosity and strength properties, is considered of extreme importance to all users of oxidized starch.

Advantages of the new hypochlorite-oxidized starches

As a result of these improvements in manufacture, the new Claro starches show certain advantages over the older type of hypochlorite-oxidized starches. In particular, three important properties have been enhanced:

1. lower gelatinization temperature,
2. less "setback" of the cooked paste and
3. increased paste transparency.

Gelatinization Temperature: Starches consist of minute cells or granules, which start to swell and dissolve when heated in water medium beyond a certain critical temperature. Actually, all the granules do not swell at the same point, but over a range of temperature (e.g., 62° — 72° C for unmodified corn starch). This so-called gelatinization range of the starch is determined on a heated microscope stage by a recently published method (1). The following tabulation shows the decreased gelatinization range obtained with the new Claro starches, as compared with the previous hypochlorite - oxidized starches of comparable viscosity grade:

Code No.	New Claro Starches	Previous Products
5541	54.5 - 72.5	61.5 - 75
5583	54 - 70	60 - 74.5
5591	52 - 68.5	58.5 - 74

This lowered gelatinization temperature means that the starch will cook more easily and quickly to give a completely dispersed paste. This added insurance of thorough starch pasting can be of great importance in coating color preparation, and in wet-end addition systems using uncooked starch which rely on heat of the dryers for gelatinization of the starch.

Setback: One of the best methods for evaluating the viscosity of starch products is by use of the Brabender recording viscometer. This instrument permits a starch paste to be heated at a uniformly increasing temperature, held at 95° C for an hour, then cooled to 50° C and held for an hour. A recent publication (2) describes a system of classification of starches by the graphical analysis of their Brabender viscosity curves. Figs. 2-4 show the cooking and cooling curves of three typical Claro starches, compared against comparable samples of previous hypochlorite-oxidized starches. In each case, the pasting temperature (i.e., the point at which the viscosity starts to rise) is reduced, again indicative of easier cooking. Even more important, the cooked pastes of the new Claro starches may be held at 50° C with very little thickening or setback, as compared with the previous products. This setback is probably due to starch substance which was not fully oxidized, and which therefore imparted some of the retrogradation tendencies of the original unmodified corn starch. Hence it appears that the new Claro starches are more uniformily converted than was possible by older processes of oxidation.

The improvement in non-congealing characteristics is directly related to sizing operations where, in the size distribution system, temperatures can drop rapidly and cooled starch size does not flow well or film-out properly on the paper surface.

Particularly in coating work, where color viscosity affects coat weight and performance, the importance of stable viscosity from the starch adhesive cannot be minimized.

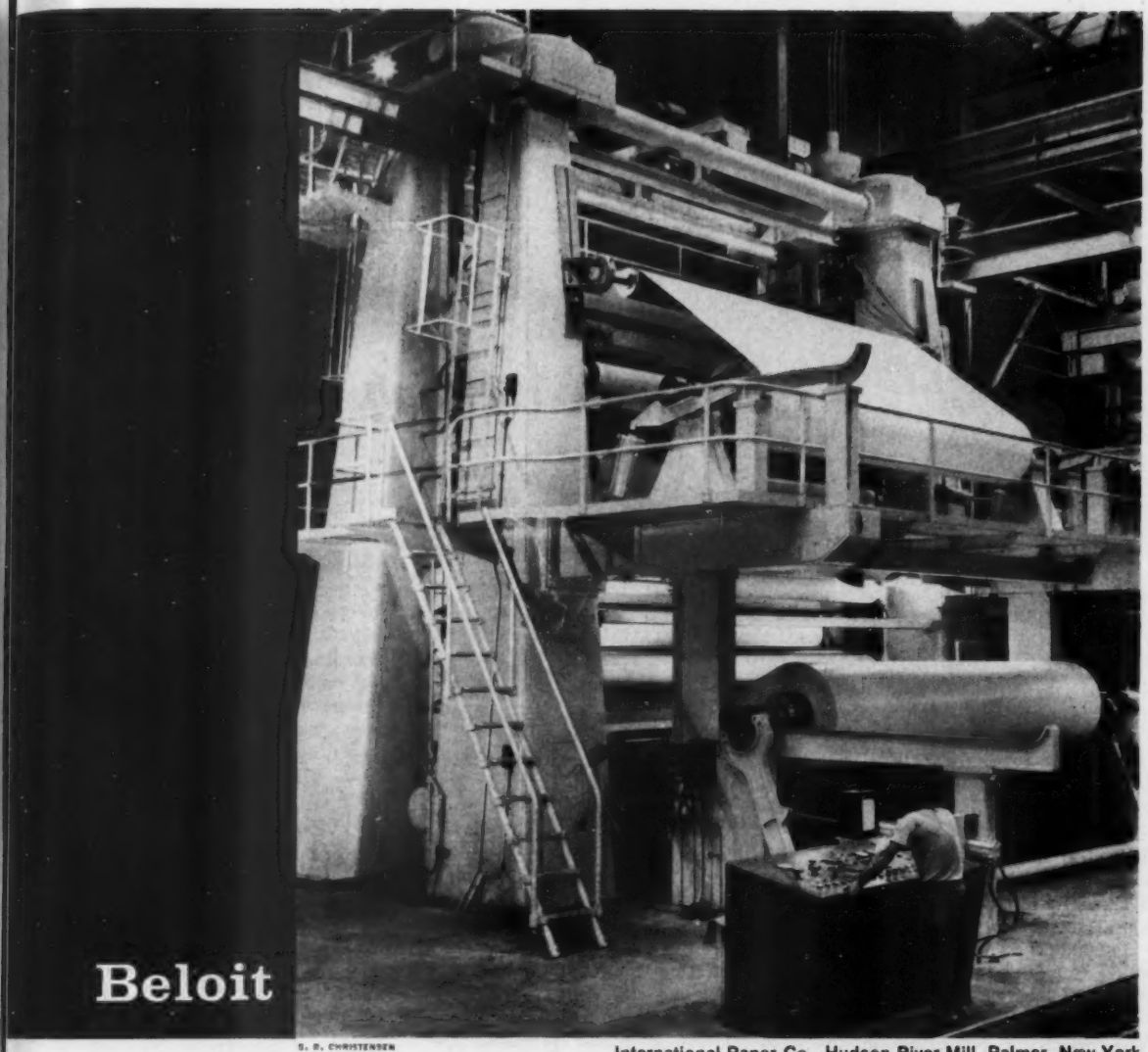
Paste Transparency: The oxidized starches have long been noted for the transparency of their pastes and films. This transparency represents maximum dispersion of the starch substance, to give solutions which are free from insoluble particles of retrograded starch, or swollen but undissolved starch granules. The transparency of a starch paste is inversely related to the amount of light "bounced back" to the observer's eye, and a reflectance technique has therefore been used to compare the relative transparencies of various oxidized starches. In Fig. 5 is shown the percentage reflectance plotted against starch paste concentration. The new Claro starch 5541 has substantially better transparency (i.e., lower reflectance) than the corresponding older product. A similar situation is observed with the Claro starch 5591. Here the older product gives a peculiar hump in its curve at 10 per cent concentration. This is attributed to under-oxidized starch which tends to retrograde and opacify the paste.

Clarity is a definite indication of film continuity and strength. Better printability is the outstanding result of these improved film properties.

While considerable progress has already been made in this work with the oxidized starches, there is evidence that further improvement is still possible.

References

1) Analytical Chemistry, *28*, 382 (1956).
2) Cereal Chemistry, *34*, 141 (1957).



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TAPPI holds 44th annual meeting

THE 44th annual meeting of the Technical Association of the Pulp and Paper Industry, held at the Commodore Hotel, New York, on February 23-26, opened with a short business meeting and two technical discussions on dissolving pulps and forest biology.

The dissolving pulps session included paper dealing with techniques of rayon yarn spinning, derivatives and performance of rayon tire cords, and the differences between cotton linter and wood pulps.

For better evaluation of wood cellulose for cellophane manufacture, E. E. Morse and H. de V. Partridge, Brown Company, described a bench-scale laboratory cellophane casting machine which casts a 5-in. wide gel film continuously at speeds up to 65 fpm. Film yield, color, and clarity of the cast film are determined for the evaluation of wood cellulose in cellophane manufacture.

The forest biology session discussed wood properties required by the paper industry in trees of the future, relationship between wood densities and other wood and pulp properties and characteristics of core or juvenile wood within a tree and among trees.

R. M. Echols, Southern Forest Experiment Station, USDA., described a method in which pairs of 10-mm increment cores are used to determine the potential pulp yield and wood quality of southern pines. The cores are extracted from opposite sides of each selected tree and a special cutting instrument separates the core into 51-mm segments for rapid specific gravity determinations. From the average specific gravity of the stem, the age, and the average diameter inside the bark a numerical rating for the tree is then established from a nomogram.

During the brief business session, Ward D. Harrison reviewed some of TAPPI's accomplishments and growth as exemplified by the establishment of the first local TAPPI section in Italy during 1958. The teller's committee report, read by Dr. R. G. MacDonald, disclosed the election of James R. Lientz of Union-Bag-Camp Paper Corp. as TAPPI's 1959 president and Harold M. Annis of Oxford Paper Co., as vice-president.

Karl O. Elderkin receives TAPPI Medal

The 27th Tappi Medal was awarded to Karl O. Elderkin, president of Bowaters Research and Developments, Inc. during the Annual TAPPI Luncheon. The medal is awarded for outstanding achievements that have contributed to technical progress in the pulp and paper industry. Mr. Elderkin, with his remarkable accomplishments in the field of paper mill engineering, was selected by the Executive Committee as the logical choice to receive this award.

Joint Research Forum

At a joint APPA-TAPPI research forum, Lt. Gen. James M. Gavin, vice president of Arthur D. Little Inc., delivered the keynote address "Research in the Space Age". He was followed by A. B. Layton, president of Crown Zellerbach Corp., who

J. W. D. Herlihy (center), Fraser Paper Co., in discussion with Gordon White, Dick Stroud (back) and John LaRue of Huyck Felt Co.

spoke on "What Top Management Expects from Research and Researcher" and Howard S. Turner, vice-president of Jones & Laughton Steel Corp. discussed "What Research Expects of Management".

Following the three papers, a panel consisting of A. B. Layton, H. S. Turner, K. O. Elderkin, D. L. Luke, and J. G. Strange replied to questions pertaining to research and its administration in the pulp and paper industry.

Pressurized high-consistency screening

Discussing pressurized high consistency screening, R. Cross, Black-Clawson Co., described several installations where pressurized screens operate ahead of the washers on softwood kraft pulp and on neutral sulfite hardwood. The advantage of performing good screening at this point is that subsequent deckering requirements are reduced, since the need for further screening of the washed stock in the pulp mill is eliminated.

According to Mr. Cross there are now some 1300 of these screens operating in pulp and paper mills throughout the world, with individual screen outputs as high as 350 tons/day. Additional advantages of these screens are: (1) low hp requirements amounting to only 50 per cent of the hp requirements of conventional screens, (2) neatness, compactness and low installation costs, (3) high-consistency operation and (4) improved formation of the mat on the washers.

New fourdrinier developments

E. Race, Scapa Dryers Ltd, England, reviewed experiments that involved some 700 synthetic dryer felts. It was found that flectural strains, abrasion, and acid were the main causes of felt deterioration. In all these areas, he said, the synthetic felts showed superior resistance. The felts best recommended contained both dacron and nylon fibers. The former have superior stress-strain qualities and excellent resistance to acid and heat, while nylon fibers show better abrasion qualities.

A revolutionary development in fourdrinier construction was discussed by J. J. Kelly and L. A. Laurence, St. Anne's Board Mill, England. The new method involves the use of multiple wires on the fourdrinier and has a tremendously improved speed potential. The sheet is formed between two wires, the upper wires being arranged over the main wire in sections — each provided with head box, auto-slice, and suction boxes — and permitting the consecutive deposition of layers of paper fibers.

A new approach to press section research was described and illustrated by C. H. Swartz, Beloit Iron Works.

Adhesion

Discussing the factors that determine good adhesion, H. F. Mark, Polytechnic Institute of Brooklyn, drew attention to the necessity of rapid establishment of a large contact area between adhesive and substrate and the formation of strong bonds between these two components. A good adhesive therefore must have the following molecular characteristics:

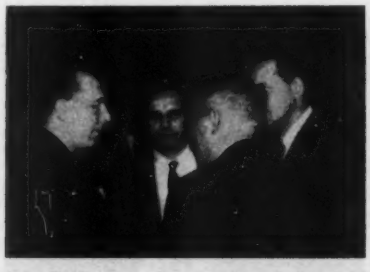
1. The chains of the adhesive polymer must have a high degree of internal mobility so that they can diffuse rapidly at the surface of the substrate and 2. These chains must carry a sufficient number of polar, or, even better, hydrogen bonding groups which are capable of establishing strong intermolecular bonds.

Location of automatic wire and felt guides

H. W. Brown, Gilbert & Nash Co., discussed the location and operation of automatic wire and felt guides to achieve maximum felt and wire life.

J. R. Lientz (at desk), 1959 TAPPI president, acknowledges applause of Dr. K. O. Elderkin, president of Bowaters Research & Development Inc., who received 1959 TAPPI Medal from G. W. E. Nicholson (far left), president of Tennessee River Pulp & Paper Co. At right is Ward Harrison, 1958 TAPPI president.

John C. Cousins and Herb Freedman of Penobscot Chemical Fibre and Al Altieri of Tiloston & Hollingsworth.



Daniel W. Lent, Alton Box Board Co., Fred Pugh and Don Korn, of General Mills Inc., and Clyde A. Benson (back) of Gibraltar Corrugated Paper Co. Inc.

Percy Cox, Consolidated Water Power & Paper Co., Frank Ware, Penick & Ford and Glen Rumberger, Sutherland Paper Co.

He suggested that the best location for a wire guide is on the wire return, a determining factor for proper control being the amount of wrap necessary to overcome the tendency of the web to travel. A 25 per cent wrap is considered to be a minimum requirement. Since felt guides respond more readily to the movement of the guide roll, more liberties may be taken with felt guide location.

Printing quality of newsprint

The results of a study of factors affecting the printing quality of newsprint, by R. W. Prince, ANPA Research Institute Inc., showed that approximately 50 per cent of the differences in printability are attributable to differences in smoothness, hardness, and brightness. Mathematical analysis of the total variance in printability on the wire side indicates that 31.5 per cent is due to the effects of smoothness alone, 10 per cent to the hardness alone, 2.5 per cent to brightness alone, and 14 per cent to a combination of smoothness, hardness and brightness varying together. Visual examination of scatter diagrams further indicates that porosity and opacity together may account for another 10 per cent of the printability variances. Basis weight, moisture, caliper and tear were found to be independent of printability.

Water conditioning trends

A sharp rise in power generation requirements and in boiler operating pressures is focusing attention on the boiler feed water conditioning systems. In a paper by C. B. Houser, Cochrane Corp., three methods of water treatment for boiler use were discussed.

(1) hot lime zeolite, (2) sodium zeolite and desilicizer and (3) clarification and demineralization.

Hot lime zeolite, favored for medium boiler pressures under 1000 psi, has the advantage of greater versatility to handle variable water compositions. Sodium zeolite and desilicizer has the advantage of eliminating acid in the regeneration, as well as simplicity of operation. The demineralizer produces the best quality of effluent, which is lowest in solids, alkalinity and silica. It requires, however, a modern pre-treatment clarification plant to protect the resin from fouling.

A new process of water filtration — reversible diatomite filtration — was described by J. G. Brown. The advantages of the system include: excellent removal of bacteria, algae, color, and turpidity at reasonable operating cost. It replaces the sand filter which requires a large installation area and is difficult to clean.

Effect of pH and alum loading on the activity of polyacrylamide type flocculants

J. L. Date and J. M. Shute of Dow Chemical Co., showed that the performance of polyacrylamide-type flocculations is greatly affected in the paper machine furnish by the alum loading and pH. Increases of 200-300 per cent in freeness values on pulps with initial freeness of 100 cc were achieved at very low polymer loading. It was suggested that within the optimum pH range, aluminum compounds apparently act as linking agents between the anionic fiber and organic matter and the comparatively nonionic acrylamide.

Determination of lignin in high purity pulps

R. Bartunek, Vereinigte Glanzstoff-Fabriken A. G., described a nonhydrolytic spectrophotometric method for determining lignin in high purity pulps. The intensity of the yellow color developed by treating wood pulp with warm dilute nitric acid is used as the basis for this method. Neither hemicelluloses nor extractives were found to influence the reaction which shows a 261 millimicron maximum for the benzene ring and a 330-338 millimicron maximum for the phenolic hydroxyl groups.

Flotation saveall control system

G. Klebanoff, Jr. and C. G. Buellman, The Permutit Co., described control systems used to obtain best economical control of new flotation saveall installations and to improve the performance of existing installations. The use of the control systems is designed to:

(1) Save additional fiber or pigment currently being lost; (2) improve the clarity of the treated whitewater by removing more suspended solids; (3) decrease the number of man hours required for operation; and (4) minimize chemical feed dosages.

Bleaching with sodium chlorate

W. H. Rapson, C. B. Anderson and R. W. Miller, University of Toronto, discussed the results of their investigation on the direct use of sodium chlorate for pulp bleaching without first converting it into chlorine dioxide. It was found that in all direct comparisons, chlorine dioxide gave higher maximum brightness even when used in quantities considerably less than the equivalent quantities of sodium chlorate. In addition the use of sodium chlorate results in considerable degradation of cellulose, while no significant degradation is shown by chlorine dioxide.

New aluminum pigment systems in paper coating

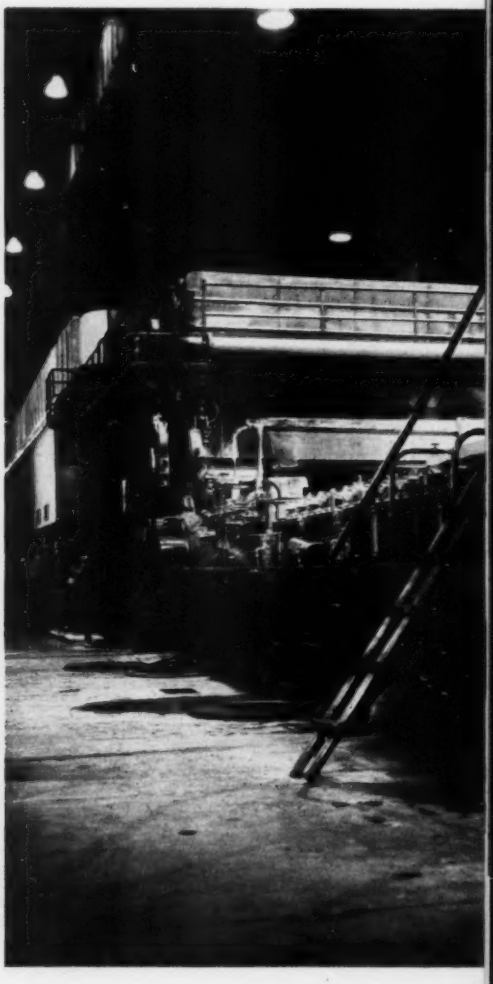
A. F. Knoll, Metals Disintegrating Co., described a procedure that eliminates gas formation of aluminum pigment in water base coatings. This procedure is applicable over a pH range of approximately 3 to 9 and with a variety of latex and other film forming vehicles. He also described a water dispersible organic solvent thinned aluminum paste that yields coatings on absorptive surfaces of excellent water resistance, adhesion and brightness.

J. A. Van Den Akker, Institute of Paper Chemistry and Dr. W. Galley, E. B. Eddy Co.

Al Altieri (center), Tileston & Hollingsworth, D. D. Uong and E. E. Pendleton Jr., Fitchburg Paper Co.

W. D. Freeman of Monadnock Paper Mills Inc. and Dom Spinnozi of du Pont.

DRAMATIC MOMENTS IN PAPER-MAKING PROGRESS



Completely new or completely rebuilt, the first production run on a paper-making machine is an exciting event to everyone concerned. To Fraser Paper, Ltd., owner of this rebuilt Fourdrinier machine, the speed of its first run (1500 f.p.m.) and its faultless operation are deeply satisfying.

To Pusey and Jones of Wilmington, Delaware, who did the work, the event is no less important. A completely new Fourdrinier with 228-inch-wide wire 100 feet long was installed, after pre-assembly at the Pusey and Jones plant. A vacuum pickup and an after-dryer section with completely enclosed gearing were added. The entire machine, from headbox to reel, was carefully inspected and parts replaced whenever necessary.

Pusey and Jones can serve you, too, by rebuilding your present machine, designing and building a new one, or by supplying such devices an an Automatic Air Guide System or a Differential Hydraulic Drive.

Left, Above: *Wire width of rebuilt machine is 228 inches, wire length, 100 ft. Machine is in Fraser Paper's mill at Madawaska, Maine.*

Right, Above: *Overall view of 2000 f.p.m. machine which was completely rebuilt by Pusey and Jones for Fraser Paper, Ltd.*

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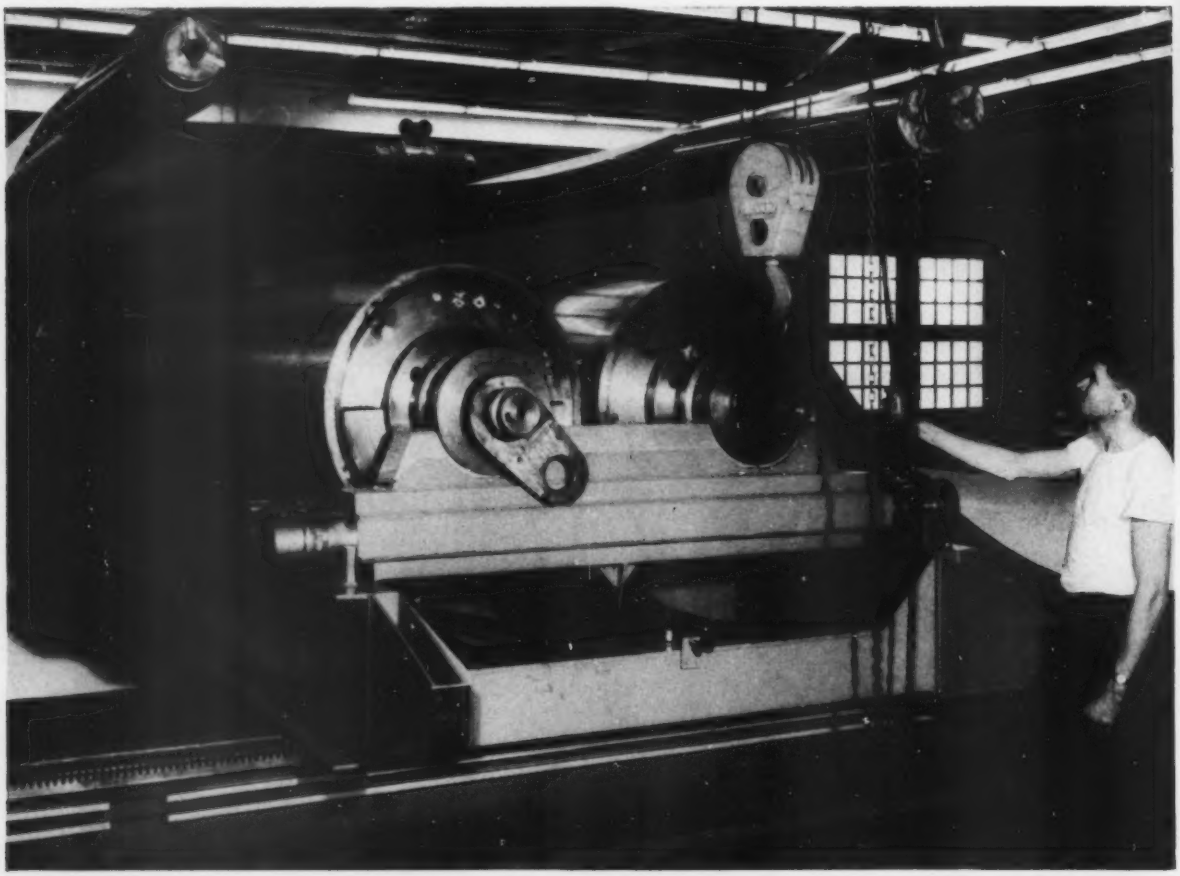
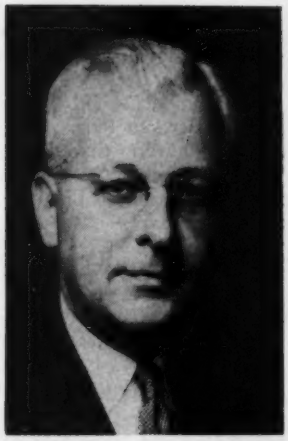


APPLETON WIRES ARE GOOD WIRES

Appleton Wire Works, Inc. Plants at Appleton, Wis. and Montgomery, Ala. International Wire Works, Menasha, Wis.

82nd annual APPA meeting



J. R. Kimberly — Reelected President for APPA for 1959-1960

by WARREN B. BULLOCK

FOR the first time in history, the two great associations of the United States Paper Industry — the American Paper & Pulp Association and the Technical Association of the Pulp and Paper Industry — join hands to climax the annual Paper Week conventions with a forum on a subject of maximum importance to both technologists and management — research.

The APPA-TAPPI joint forum that was held February 26 at the Waldorf-Astoria, New York, was a brilliant conclusion to a week in which other major topics, such as Russian economic drive, possibilities for export market development and the Industry's fiscal situation were analyzed by experts in their respective fields.

At the forum the importance of research to the future of the paper industry was stressed by three outstanding speakers. Lt. General J. M. Gavin, now vice president of Arthur D. Little & Co., famed for his efforts in the development of space satellites, was specific in naming fields in the paper industry in which research could be profitably applied. He also said that "research will be the major influence on the pulp and paper industries in the space age". Gen. Gavin was more specific in his discussion of the practical application of research to the paper industry than either of the industry speakers who followed.

Dr. Howard S. Turner, vice president of research and development for Jones & Laughlin Steel Corp., in discussing What Research Expects of Management, stressed his belief that research should be a member of corporate management with the corporation head holding other departments accountable for extracting and using information developed by research. "While research starts the train moving", he said, "there is no cash in the drawer until the company, operating as a whole, has brought all of its components to bear".

The potentialities of the newly-established European free trade area featured the open meetings of the Export Committee of the APPA. Western Europe was described by Eric Lagerloef, secretary of the Committee, as a potentially increased market for American paper in view of an almost certain increase in consumption of 3½ per cent annually, in which the United States should share. For instance, in 1957 alone, the United States shipped paper and its products valued at $90,000,000 into the free trade area.

An optimistic view of the possibilities for increased paper exports to the Western Europe community was also voiced by Charles N. Auer, president of the United States Paper Exporters Council and Donald F. Heatherington, director of the European division of the National Foreign Trade Council.

A brilliant future is ahead

Reports were present at each of the dozen or more divisional group conventions to indicate the manner in which the industry has recovered from the recession of 1957 and the prospects for the future. Most of these reports were conservatively optimistic. Morris C. Dobrow, executive secretary of the Writing Paper Manufacturers Association, said that there are strong indications

of an upturn and that the decade of the 1960's has a brilliant future.

In the fine paper field, the early months of 1959 have seen an increase in the order back logs. S. D. Fleet, president of the Kraft Association, estimated that the demand for kraft in 1959 should expand by close to 200,000 tons. He added that the coming into production in 1959 of new machines will conclude, for the present, the expansion of the past twenty years, and further expansion may well be deferred until demand has risen.

M. C. McDonald, president of Great Northern Paper Co., told the newsprint group that there is ample productive capacity to meet any likely immediate increase in domestic and foreign demand. R. M. Fowler, president of the Canadian Pulp and Paper Association, said that a normal excess of capacity over demand might be advantageous.

A. B. Layton, president of Crown Zellerbach Corp., in outlining what management expects of research said: "Our industry has lagged in its scientific research efforts compared to other basic and growth industries". As one of the fields in which he envisages important advancement possibilities, Mr. Layton said that industry should learn to utilize the other 50 per cent of the tree that is presently wasted. Comparing the paper industry with the developments in coal tar and petroleum fields, he said: "We have the same research potential and the opportunity to create a complete new industry and additional sources of profits without using one more pound of wood than we now bring into our mills for the manufacture of pulp".

Meanwhile, in many meetings of groups within the industry, graphic examples of research already applied or in prospect were disclosed. Success of efforts to dispose of waste to prevent pollution of the nation's streams, and improved use of hardwood were among the subjects of discussion.

D. J. McLaurin, chief of the pulping department at the Insitute of Paper Chemistry, said that the inventory of hardwoods is increasing rapidly while the supply of softwoods is about equal to the demand. Practical efforts to utilize this hardwood in a pilot plant of the Brown Company were reported as already successful. Research is also being utilized to develop bigger and better markets by the use of plastics and various chemical and mechanical processes.

Future good for exports

James L. Ritchie, executive director of the United States Pulp Producers Association, said that reports of Russian sales of pulp in this country indicated that U.S.S.R. was out to create economic confusion in the free world. He thought it "possible" that Russia would continue to export pulp at a price well under that of other producers but he said that Russia could not become a significant pulp exporter before 1956.

He put sales to the United States in December at 214 tons and figured the price of this shipment at $112.95 per ton, exclusive of ocean and inland freight and insurance. Bleached pulp similar to that received here would sell at a considerably higher figure, he indicated.

Other notes of interest from the meeting

"In a competitive capitalistic society such as ours, the teacher, scientist and intellectual have been relegated by the public to an underpaid 'Ichabod Crane' status". This was stated by **Dr. Jean Paul Mather,** president of the University of Massachusetts, as he addressed the group attending the annual APPA dinner at the Waldorf-Astoria.

He went on to stress that industry has a stake in a comparative society even in pure research, and many of our large corporations would be doing the best possible national and international service to their stockholders and the public if they would allocate funds to provide for the subsidization of the best minds — and expect of these best minds only thinking rather than gizmo or gadget production.

Mather also stated that corporations represent the only American device by which large sums of money can be raised for education and the increased productivity of college graduates to the corporate capital raising device.

• • •

Carl C. Landegger, vice president of Black-Clawson Co., was one of the principal speakers at the open meeting of the APPA's Materials Committee. He presented an economic forecast and review of the pulp and paper mill machinery. In discussing the price trends of machinery, he stated that many cost factors involving redesign, new materials, better fabrication, etc., enter into the price readjustments for each product. He went on to state that all reputable concerns manufacturing machinery for the paper industry are fighting the spiral with every resource.

Landegger predicted: "considering the inflationary rise, capital expenditures for pulp and paper making machinery will continue to rise at an average rate of about 4.7 per cent per year".

• • •

Dr. Thomas S. Chambers, chemist and consultant to Owens-Corning Fiberglass Corp., outlined some economic aspects of fibrous glass as a papermaking material. He drew attention to the fact that the development of specialties incorporating fibrous glass offers an attractive means of participating in one of the significant business trends in the paper industry.

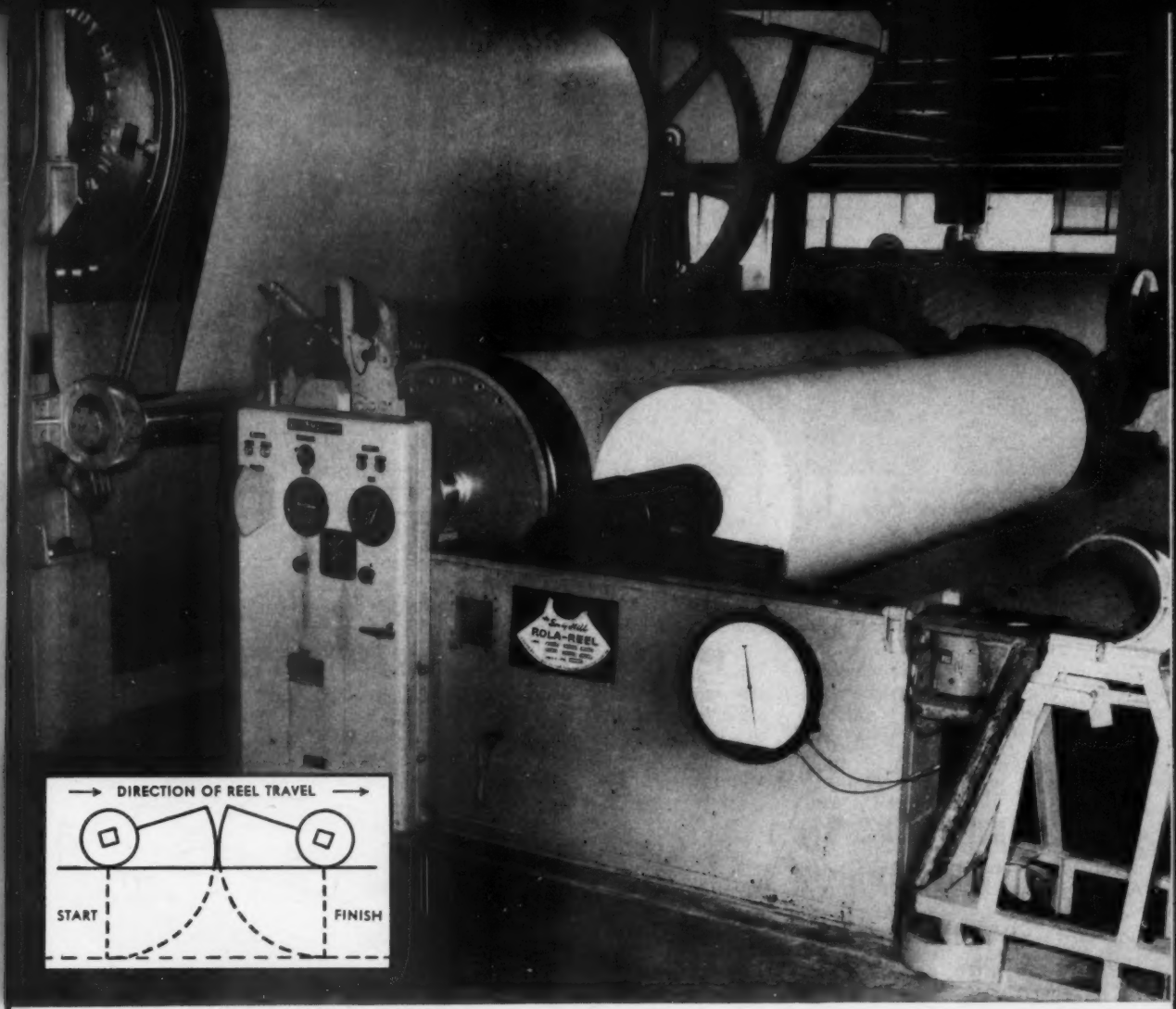
Chambers stated, "This qualitative view of the economic outlook for fibrous glass in papermaking is stimulating and encouraging, but there are problems to be solved before the prospects can be realized on a substantial scale. While the details of this economic potential cannot yet be defined, the sum total looks attractive when analyzed in terms of the industry's trends and needs.

• • •

W. L. Thornton Jr., general traffic manager for Kimberly-Clark Corp., stated in his discussion on transportation, that because the railroad plays such a vital role in the paper industry, we should take an active interest in some of the regulatory problems of the railroad. Thornton feels that we should lend our support to those things that we believe will be good for the railroad, and thus good for us.

• • •

Speaking at the Sulphite Paper Manufacturers Association Inc. meeting, **Raymond Rodgers,** professor of banking, New York University, listed some of the more important causes of the wide-spread fear of inflation as follows:



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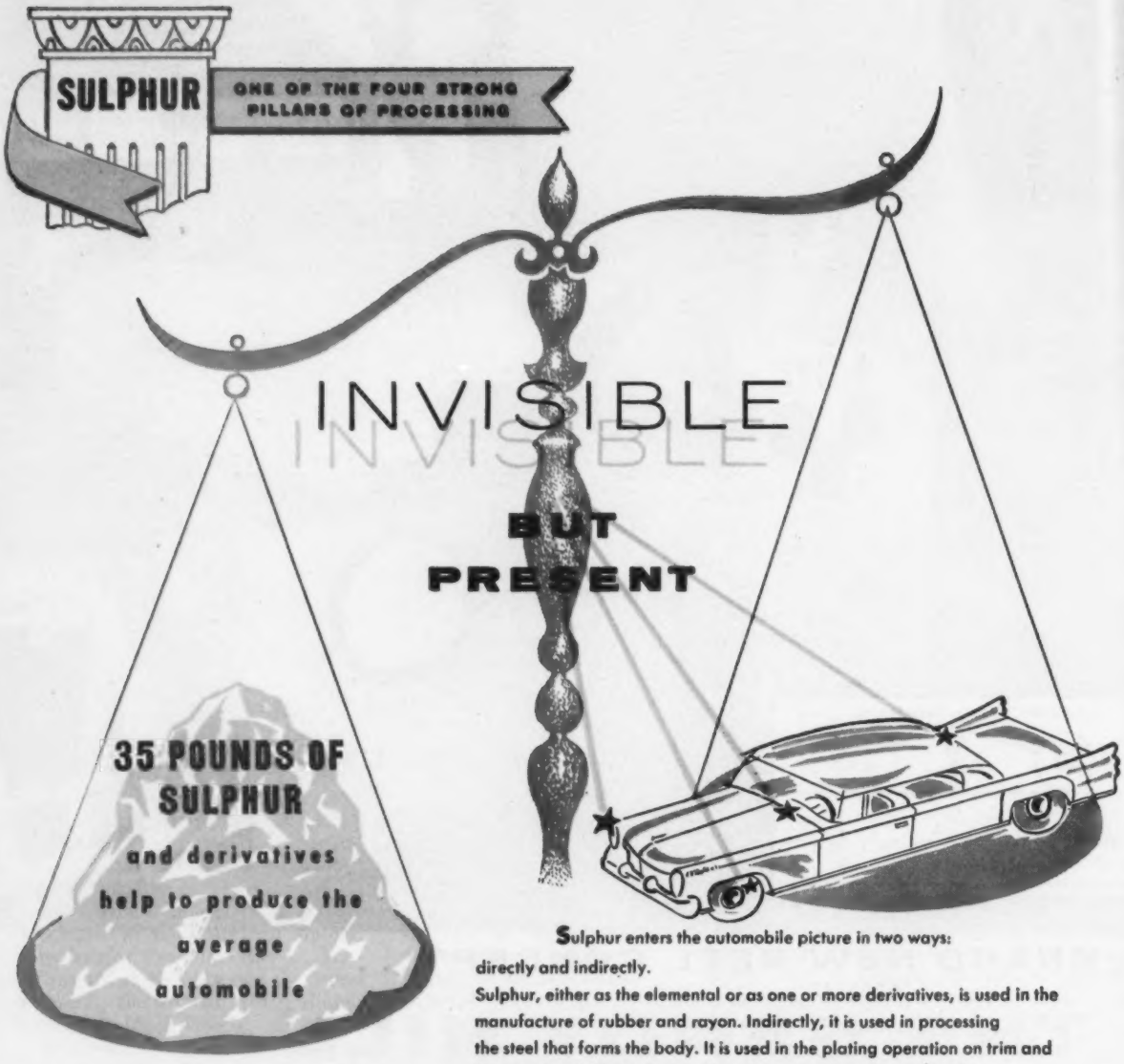
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35 POUNDS OF SULPHUR
and derivatives help to produce the average automobile

Sulphur enters the automobile picture in two ways: directly and indirectly.

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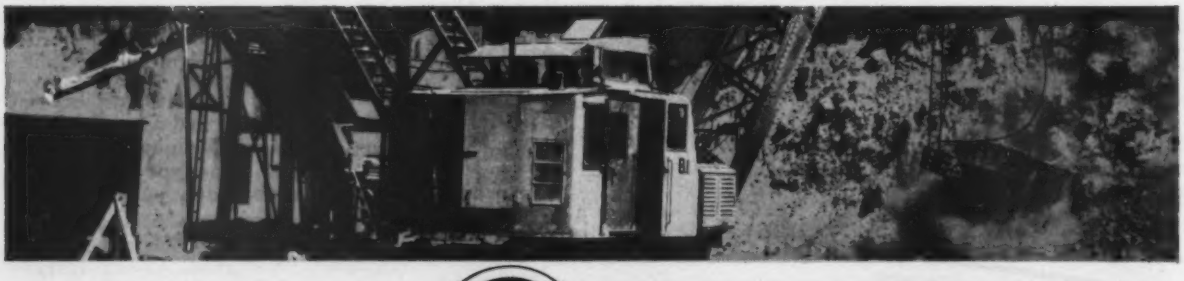

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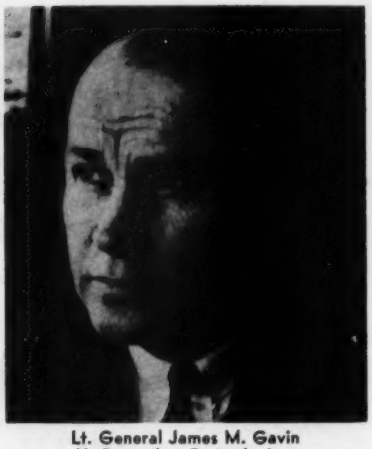
Dr. Howard Turner
V. P., Jones & Laughlin Steel Corp.



Lt. General James M. Gavin
V. P., Arthur D. Little Inc.

1. Government spending seems to be out of control and budgets are balanced, if at all, by increased taxation rather than by reduction in expenditures.
2. The current large deficit of the Federal government is being financed primarily through short-term obligations sold to commercial banks and corporations. This tends to increase the money supply and its liquidity.
3. Wages which are an important cost-push factor have risen almost continuously in recent years.
4. The unprecedented boom in the stock market is interpreted as a lack of confidence in the purchasing power of the dollar.

Prof. Rodgers concluded that inflation is not inevitable. Among the anti-inflationary pressures he listed such factors as excess production capacity, increasing productivity, world-wide weakness in raw material prices, growing unemployment, and increasing credit restraint. In addition, the return to limited convertibility of the more important foreign currencies, the establishment of the common market in Europe and the substantial completion of the rebuilding boom in the countries of the Free World will greatly increase competition not only in world markets but also in the domestic market. This competition will force us either to devalue our dollar or to adopt fiscal and monetary measures which will bring inflation under control.

• • •

Dr. Roy P. Whitney, vice president and dean, The Institute of Paper Chemistry, discussed recent developments in papermaking at the annual meeting of the Association of Pulp Consumers Inc. His discussion dealt with the newer physical and engineering aspects in papermaking and concentrated on studies of the drainage of water from fibrous suspensions and studies of fiber flocculation.

The need for making drainage devices as effective as possible becomes apparent from the fact that 65 per cent of the water flowing through the slice is removed on the table roll section of the machine, 33 per cent is removed on the suction boxes and the suction couch roll, 1 per cent is removed on the presses and the remaining 1 per cent on the dryers. Dr. Whitney also said that it is 10 times more expensive to evaporate water than to remove it mechanically.

Dr. Whitney then discussed the mechanism of water removal at the table rolls. The major driving force causing water removal here, he said, is a suction developed in the downstream nip between wire and table roll. This suction is related to the kinetic energy of the flowing stock and therefore increases very strongly with machine speed. This suction reaches a maximum value, as is indicated by equations, at a machine speed of 2800 fpm. In actual practice, the maximum suction effect of the table rolls is reached at about 2500-2600 fpm.

Donald F. Heatherington, director, European Div. of the National Foreign Trade Council Inc. speaking before the session of the Export Committee. Other guest speakers were W. K. Hora, assistant cashier, First National City Bank of New York, and C. P. Auer, president, U.S. Paper Exporters Council Inc.

Lt. General James M. Gavin opening the Joint APPA-TAPPI Research Forum. Dr. Howard S. Turner and Alfred B. Layton were also the main speakers on the subject of research. K. O. Elderkin, president, Bowaters Research & Development Inc. and David L. Luke, president, West Virginia Pulp & Paper Co. opened the general discussion.

DOWN

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They cost too much money!

VICKERY FELT CONDITIONERS keep press felts continuously clean, open and absorbent, no matter what the size and speed of the felt.

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No more taking the weights off the presses and slowing down toward the end of the run.

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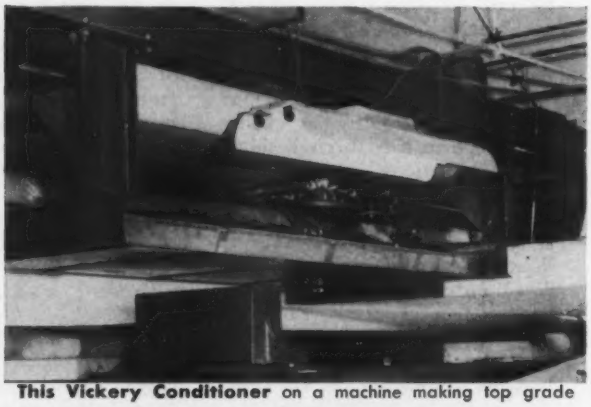
This Vickery Conditioner with four conditioning boxes on a big, high speed book machine felt is of the new, self-contained traveling header design. It is equipped with hydraulic drive.



This Vickery Conditioner on a machine making top grade writings is saving *two or three shutdowns a week.*

Vickery Wet Felt Conditioners are doing an equally effective, money-saving job of reducing cylinder machine shutdowns. Top and bottom felts are continuously clean and open. Crushing is often avoided. Shower volume is minimized. Felt life is often greatly increased. Machine speed is maintained right through the week.

VICKERY FELT CONDITIONERS

CURRENT COMMENTS

A growing industry . . . the newsprint picture . . . and favorable comments

By WARREN B. BULLOCK

The startling growth of a relatively new industry, the manufacture of particle boards, is reported by the Forest Products Division of the federal Business and Defense Services Administration. According to a survey just released, there are now forty-six manufacturers of this building material located in 19 states with a 1957 production of 182,883,000 sq. ft. The product is made from shavings, splinters and other wood residue combined with a resin adhesive and converted into panel form for use in furniture, inlaying, paneling, doors and other residential construction. Particle board is rapidly becoming a serious competitor of the older types of wallboards made on paper machines from woodpulp.

Another development resulting from combined research into the plastic and cellulose field is announced with the formation of a new concern, Fome-Cor Corporation, jointly owned by St. Regis Paper Co. and Monsanto Chemical Co., to produce a new type of panel stock for a broad range of uses. The new material is described as foamed-plastic and paper laminated into sandwich form. It appears to be a first cousin of panelyte, already manufactured by St. Regis of a cellulose base heavily-impregnated with synthetic resins of the bakelite type. Fome-Cor, previously produced experimentally at a St. Regis subsidiary plant, the Superior Paper Products Co., Mt. Wolf, Pa., will be manufactured for the market in a new and larger plant at Addyston, Ohio. This plastic paper sandwich is the result of a joint technological program initiated by the two companies early in 1956.

A drop in demand

Supplies of newsprint are ample with newsprint mills operating at only 84 per cent of capacity, according to a statement by Robert M. Fowler, president of the Newsprint Association of Canada, at a convention of the New York State Publishers Association. Mr. Fowler said demand dropped 300,000 tons last year and added: "If we stay there or below that level, it is inescapeable by the forces of economics that either the costs of your principal raw material (newsprint) will rise or some part of the idle capacity will be forced out of existence."

Another Canadian, David Fulton, Minister of Justice and Attorney General of Canada, told the Anti-Trust Section of the New York State Bar Association that American anti-trust suits against subsidiaries in Canada of American corporations are an invasion of Canadian sovereignty. He specified United States suits against Canadian electronics subsidiaries of American companies, but he did not refer to the long standing efforts of the United States to force Canadian subsidiaries of United States paper companies to disclose details of their newsprint pricing.

A different phase of the newsprint picture is the series of experiments being conducted by two Appleton, Wis., paper companies, in cooperation with a local newspaper and a machine manufacturer, to supercalender newsprint until it acquires the printing paper characteristics of book paper. This new type newsprint has not yet been processed in quantity.

Wall Street comments

Paper companies are more and more a source of favorable comment by Wall Street financial writers. Analyses of the month list Scott as one of the outstandingly successful companies. St. Regis is another, and the outlook for Brown is showing improvement after three years of its development program. An issue of $20,036,000 of 4½ per cent bonds of Champion Paper & Fibre Co. was followed by a two-day jump in prices of the common stock of $7.00 per share. The New York Society of Security Analysts was told by President Russell F. Erickson of Rayonier Inc., that the addition of 6,650,000 tons of surplus cellulose capacity in recent years could not be absorbed without adverse effects on the market, but the "remarkable thing is that the adverse effects were not harsher than they were."

Farm waste as raw material

A ten million dollar expansion of American Israeli Paper Mills, Ltd., established in Israel by United States paper making interests and largely financed by American backers, will specialize in the use of farm waste as its raw material, instead of the wood pulp formerly purchased in Scandinavia. The company's present machine makes various types of paper under a unique program by which one grade of paper or paperboard is produced until there is an adequate stockpile and the machine is then converted to the manufacture of other grades of paper or board in turn. While the Mazer family, major stockholders in Hudson Pulp and Paper Co., are the principals in the Israeli project, there is no corporate relationship between the two companies.

An exchange of stock

National Vulcanized Fibre company has concluded an agreement to exchange 76,000 shares of its stock for the entire outstanding 16,200 shares of the Parsons Paper Co. of Holyoke, Mass. Parsons is an old time manufacturer of fine rag and cotton content papers, having been founded over 100 years ago.

Financial reports

At a time when Wall Street prices have been hovering around all-time highs, investors in paper mill securities have become selective. Prices of individual stocks have risen or fallen, depending on indications of their various successes as shown by income figures. When some popular common stocks have reached record-high values, very

Longer Life
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SCAPA
*Synthetic Reinforced Cotton Dryer Felt

Type #1164-S and #1166-S

Running up to double life of competitive cotton felts—outrunning asbestos felts in many cases—bringing the advantage of faster drying found only in cotton felts.

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WAYCROSS, GEORGIA

Current Comments . . .

few paper mill stocks have broken previous records, though few have shown pronounced weakness.

Net Incomes

Brown Co.—For year ending November 30, $1,295,631; previous year, $2,080,303.

Celotex Corp.—For year ending October 31, $3,127,521; previous year, $3,883,856.

Champion Paper & Fibre Co.—For nine months ending December 31, $5,693,614; a year ago $9,095,951.

Container Corp. of America—Net 1958 income, $14,513,972; previous year, $14,589,692.

Union Bag-Camp Corp.—Net 1958 income, $15,650,000; previous year $18,133,345.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	Feb. 10, 1959	Jan. 9, 1959
American Can	49⅛	50¼
Same Pref.	39¾	39½
Celotex	39⅛	39⅛
Same Pref.	* 19⅛-19½	18½
Certain-Teed	14⅜	14¾
Champion P & F	46	42
Same Pref.	* 96⅛-97½	96
Chesapeake	35⅛	* 34¼-35
Container	27⅝	29⅛
Same Pref.	* 89-91½	* 90-91½
Continental Can	52¾	58
Same Pref.	* 83½-85	* 83½-85¼
Crown-Zellerbach	53¾	59
Same Pref.	96	96½
Diamond Gardner	34⅛	33½
Same Pref.	* 30¼-31¾	31¾
Federal Paper Board	* 53-53½	52
Same Pref.	* 23-23¾	21⅜
Fibre Paperboard	48⅛	49½
Same Pref.	*162-168	164
Great Northern	49	51½
Hammermill	30⅛	32
International	119¼	120⅜
Same Pref.	92	92
Kimberly-Clark	62	65½
McAndrews & Forbes	32¼	23½
Masonite	37⅝	40
Mead	47½	46⅜
Same Pref.	* 92½-94	* 93½-95
Minnesota & Ontario	36⅛	34⅞
Oxford	33	33¼
Same Pref.	* 98-99	* 95-96
Rayonier	20⅛	21⅛
Riegel	34¾	35⅞
St. Regis	44¼	44
Same Pref.	95½	* 96-98
Scott	78¼	73½
Same $4 Pref.	* 91-93	* 92-94
Same $3.40 Pref.	* 73-78½	81
Sealright	41½	43⅝
Standard Packaging	29¾	29⅞
Same $1.60 Pref.	* 86-89	86
Same $1.20 Pref.	34	33¼
Sutherland	43	40⅝
Union Bag-Camp	42¾	43⅜
United B & C	30⅞	28⅛
United Wallpaper	9½	8¾
Same Pref.	* 17½-18	* 14⅝-15
U. S. Gypsum	103½	93½
Same Pref.	*159-161	*161-165
West Virginia	43⅜	47
Same Pref.	97½	* 98-99

New York Stock Exchange — Bonds

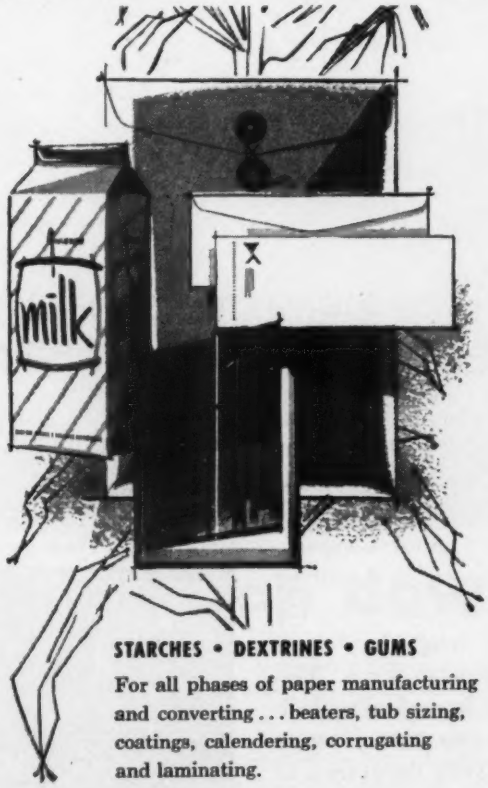
Champion P. & F. 3¾%	—	—
Champion P. & F. 3%	94	—
Champion P. & F. 4½%	116	—
Diamond Gardner 4%.	97	97
Kimberly-Clark 3¾%.	—	—
Mead 3%	—	—
Oxford 4¾%	113½	114
Scott 3%	110¾	106

American Stock Exchange — Stocks

Allied Paper	9½	9⅜
American Writing	32½	31¾
Brown	13¾	14
Puget Sound	21½	18¾

*Closing Bid and Asked Prices

Look what happened to the corn we took off the cob



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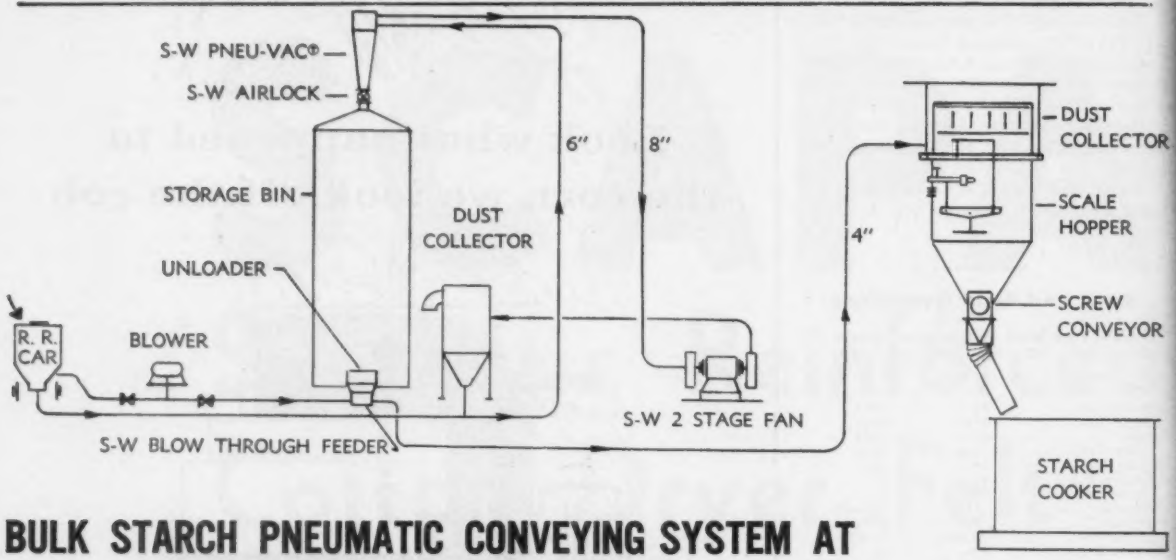
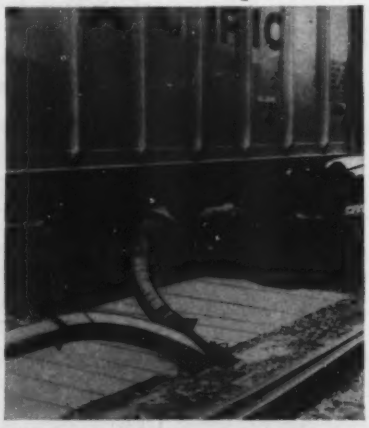
Published in the interest of better pulp and paper processing by Sprout, Waldron & Co., Inc., Muncy, Pennsylvania



BULK STARCH PNEUMATIC CONVEYING SYSTEM AT WEYERHAEUSER TIMBER COMPANY

Lower cost, less contamination, cleaner and safer working conditions . . . are among the advantages cited by the Pulp Division, Weyerhaeuser Timber Company, Springfield, Oregon, in describing its new bulk starch conveying and storage system, designed and engineered by Sprout-Waldron. The system is used for unloading bulk starch from hopper bottom cars as well as for taking the starch to bulk storage and from there to cooking vats in weighed quantities. According to the engineers at Weyerhaeuser, the new method uses pushbuttons and automatic controls to take the place of the back-breaking toil and guesswork.

Weyerhaeuser unloads an average of one 50 ton Airslide car per week. Unloading time, including hookup, changing hoppers, etc. is between seven and eight hours with the actual unloading rate set at 10 tons per hour. Prior to using Airslide cars, ordinary hopper cars were used. These required continuous rodding to get the starch to unload and resulted in unloading times of nearly double that which is now secured through the use of Airslide cars.

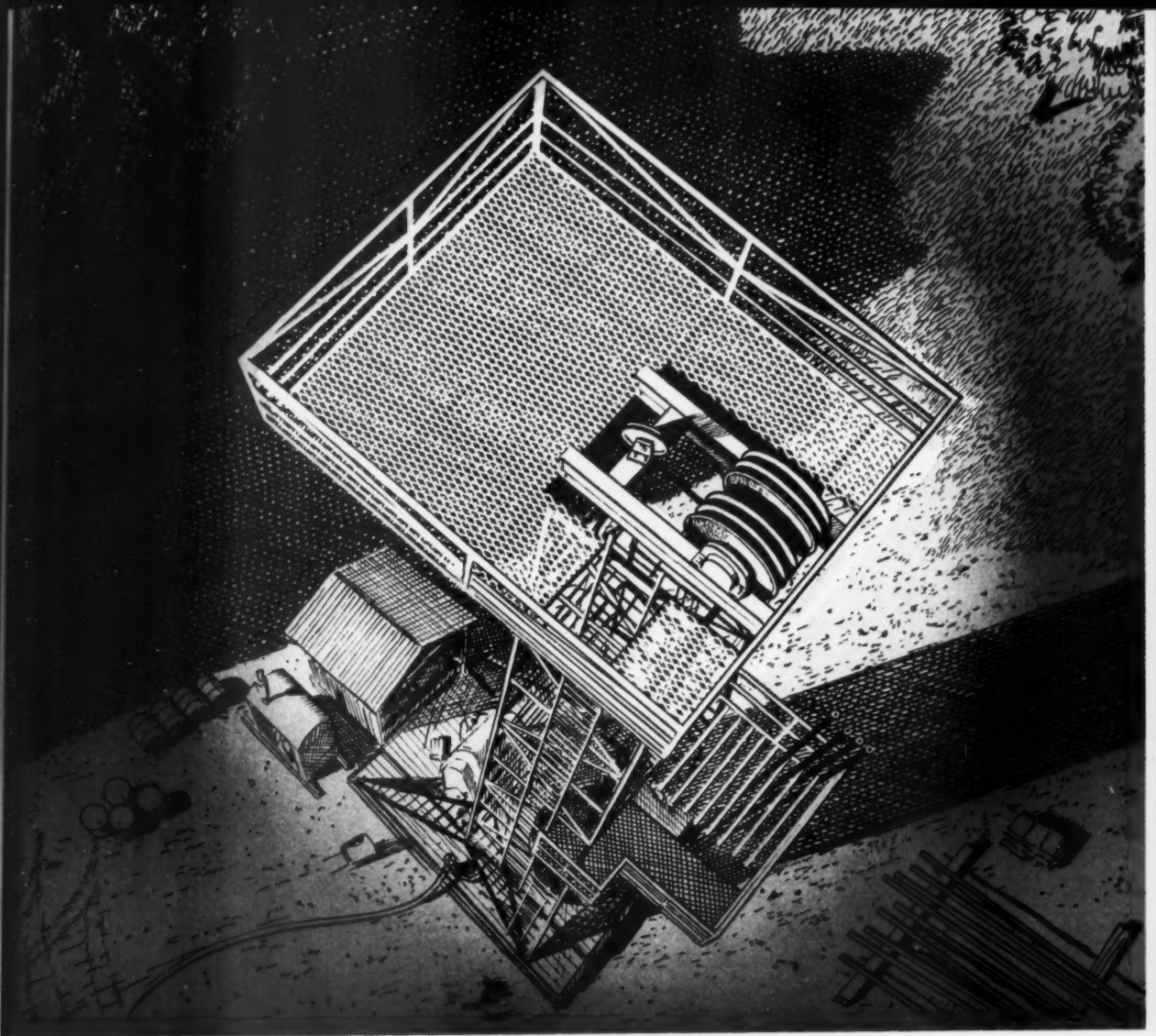


Key equipment in the bulk unloading method are the Sprout-Waldron Pneu-Vac® negative pressure system which unloads the Airslide cars and delivers the starch into the glass-lined storage bins; and the Sprout-Waldron Pneu-Flo® positive pressure system which actuates the car and conveys the starch from the bin unloader to the scale hopper.

For details on how Sprout-Waldron pneumatic handling systems can cut your conveying and storage costs, contact your Sprout-Waldron representative.

The following specific bulletins may be of interest. F-19 Handling Starch at Morningstar-Paisley. I-28 Practical Pneumatic Conveyor Design. 18-E Pneu-Vac Negative Pressure Pneumatic Systems.

BF/201



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Layne service doesn't stop there. A dependable Layne Pump specially designed for the job to deliver a specified QUANTITY of water, and Layne water treatment service to supply the exact QUALITY of water desired, are part of a complete job with undivided responsibility. But, that's not all. Layne maintenance and repair service wraps up the complete package. Your nearby Layne Company is as close as your telephone, so, call on Layne for a dependable water supply, right . . . from the top down, all backed by Layne Research.

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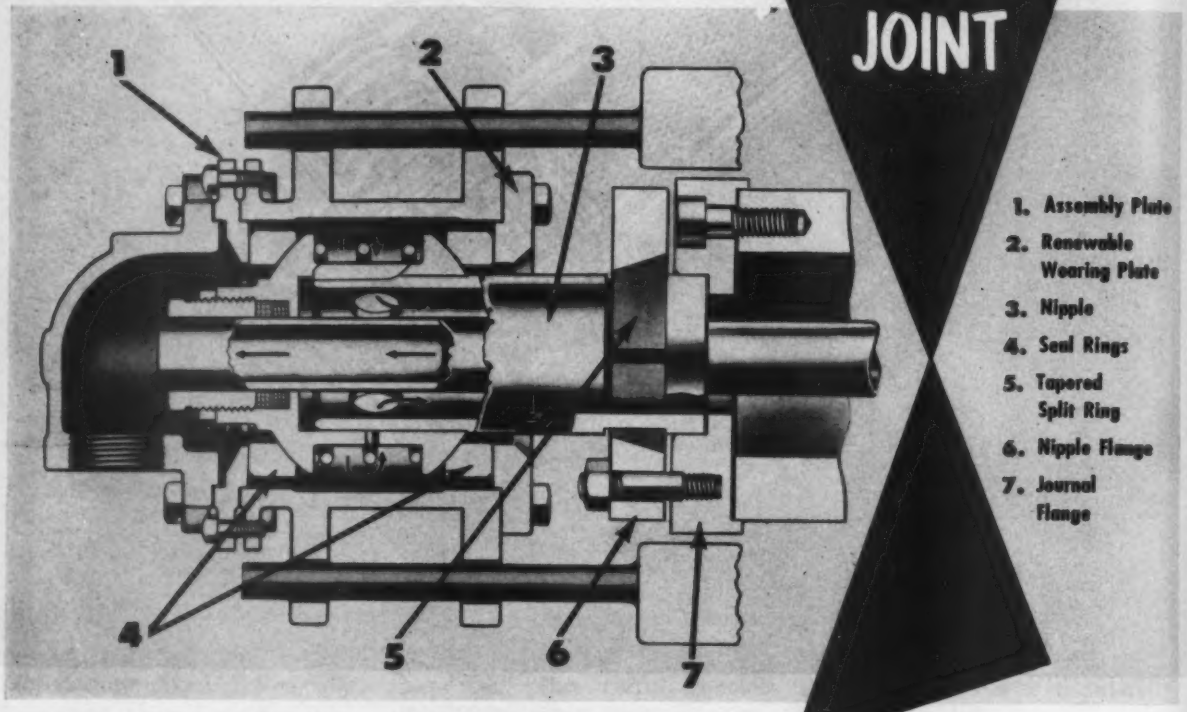

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2. Renewable Wearing Plate
3. Nipple
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Simple, Time-Proved Design—Has the famed packless seal perfected by Johnson, needs no lubrication or adjustment. Internal assembly has just a few simple parts, which means fewer breeding places for trouble, easier field servicing. Assembly plate provides ready access to syphon pipe.

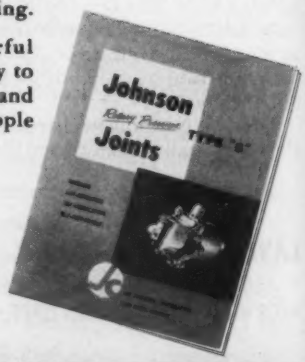
SUPER Construction—Teams "Green Streak" seal rings, of much harder and denser structure, with special Ni-Chrome plating on wearing surfaces. Result: Greatly improved friction characteristics and much longer service life.

Floating Action—Simple rod supports carry all the weight of the Type L body and connections—permit the rotating assembly to "float" freely inside. Can be adapted for machines with open or enclosed gearing.

Quick Release Nipple—Utilizes powerful wedging action to lock nipple securely to journal. Greatly simplifies installation and removal—ends danger of damaging nipple with heavy wrenches.

Johnson Joints come in types and sizes for all needs. Our offer still stands—try a pair in your mill for 90 days without obligation.

For full information on the Type L-NARQ write for copy of Bulletin N-2002.



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NEWS of the INDUSTRY

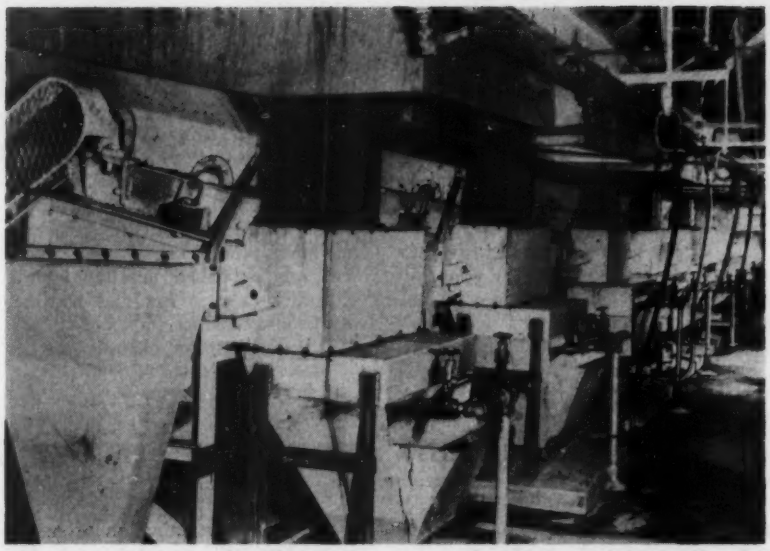
New Process for Mill Waste Destruction

Green Bay Paper & Pulp Co., Green Bay, Wis., has submitted a plan for commercial development of a new process for pulp mill waste destruction to the Wisconsin Committee on Water Pollution.

The new process is called Atomized Suspension Technique and has been developed over the last five years at the Pulp & Paper Research Institute of Canada.

In the process, a 60-ft. high tower is utilized operating at temperatures over 1400° F. to evaporate, dry and burn the pulping waste liquors that are atomized at the top of the reactor tower by special high pressure nozzles. The product is a mixture of high-temperature steam, gases and solids. The important chemicals in this mixture are separated and treated by various means to condition them for re-use in the pulp mill system.

The company has stated that the plan involves an expenditure of $750,000 in the initial development phase alone.



A NEW METHOD of dewatering neutral sulfite semichemical (NSSC) pulp by means of vibrating screens "has resulted in lower than normal horsepower requirements for refiners" at the Savannah, Ga. mill of Union Bag-Camp Paper Corp. At this plant—considered to be the largest of its kind in the world—the unwashed unrefined pulp is blown from the digesters and pumped from the blow tanks to a battery of six Link-Belt Co. NRM-135 liquid vibrating screens (above). These units reduce the moisture content from 94 to 74 per cent. The pulp is then fed to the refiners, where the softened chips in the pulp are broken up mechanically. Each refiner has a daily finished pulp capacity of 50 tons.

South Carolina to Begin Reforestation Program

The South Carolina State Commission of Forestry has authorized the production of tree seedlings for reforesting the barren acres of South Carolina.

It was not until after World War II that people again began to realize the value and profit of tree plantations on unused farm lands. In recent years, careful long-range management by governmental, commercial and private interests have balanced drain with regeneration. The state's future in forests and forest products is very promising.

Experimenting With Newsprint

Bowater's Newfoundland Pulp and Paper Mills Ltd. plans to experiment with a combination of southern U. S. sulfate pulp and groundwood in its newsprint production.

The company will import 1000 tons of Tennessee sulfate. This will be mixed with groundwood pulp in proportions running to 15 per cent or more. The purpose for the experiment is give more strength to the present newsprint.

If this test proves successful, the company will probably continue to import southern pulp regularly.

Oregon and Washington Mills Report Progress in Use of Spent Liquor

The increasing use of spent sulfite liquor in the production of useful by-products has been reported by mills in Oregon and Washington.

Puget Sound Pulp & Timber Co. at Bellingham, Wash., is launching a $400,000 program for the expansion of by-products production. First step in the project is an immediate $150,000 expansion of the company's evaporator for obtaining concentrated lignin from the waste liquor. Later a new spray dryer will be installed to produce powdered by-products.

(*The concentrate—Lignosite—is used in products for adhesives, leather tanning agents, oil well drilling mud additives, agricultural chemicals and vanillin.*)

Road Binder Use Expanding

Seven Oregon and Washington mills are building a growing business in the use of spent sulfite liquor as road binder. A total of 4669 miles of roads in the two states was surfaced with the binder in 1957, and this use of the liquor is growing rapidly.

In other Pacific Northwest developments:

1. The Oregon Fish Commision and Weyerhaeuser Timber Co. are cooperating to build an experimental natural "fish farm" capable of holding 500,000 salmon fingerlings.

2. Publishers' Paper Co. at Oregon City has completed recovery system

improvements at a cost of more than $300,000. It is reported that the project is "paying off in the more complete use of raw materials and in the protection of the Willamette river through better water quality control".

New Method of Sawing Produces Larger Chips

Large chips can now be produced by a new-type saw blade that has been developed by J. T. Griffin of Wells-Griffin Lumber Co.

The blade has only about a fifth of the number of teeth found in conventional saws. Each tooth takes a larger bite, bringing out chips of wood instead of regular sawdust. The fiber of these chips has been found to be long enough for making pulp and paper.

Twenty tons of these chips were shipped in early February to the Fernandina Beach, Fla., mill of Rayonier Inc. for a full-scale test.

Forest Products Laboratory at Madison, Wis., is also scheduled to run tests on the new saw method.

ASME to Study Air Pollution

The American Society of Mechanical Engineers recently launched a move to help towns, counties and states in dealing with the growing problem of air pollution.

In this effort, the ASME Model Smoke Ordinance will be reviewed and modernized. The present document was published in 1949 by the organization's members and has met with wide acceptance.

G. V. Williamson, chairman of the ASME Committee on Air Pollution Controls and also on the nation's outstanding authorities on air pollution, stated: "The new model will meet the needs of the modern problem. It will encourage patience in many communities and possibly prevent them from rushing into unwise legislation not suitable for their specific local problems."

Full Line of Scott Products Promoted by National Tea

National Tea Co. chose the full product line of Scott Paper Co. for a recent promotion of paper products.

This sale of 128 carloads made by Scott, has set a new high in single-order purchases of household paper products.

Products involved in the promotion were: Cut-Rite wax paper; Scotkins napkins; ScotTowels; Scotties facial tissues; and three toilet tissues—Waldorf, Soft-Weve and ScotTissue.

Recent Expansions in the Industry

Million Dollar Project

The Appleton mill of Consolidated Water Power & Paper Co. will construct a new boiler house that will be used for burning spent sulfite liquor.

This million dollar project will increase the company capacity for burning spent sulfite liquor to 47 per cent.

Two new boilers will be housed in the building. to replace six smaller capacity units which have been used. One of the new boilers is designed to burn oil and 20,000 lbs of 55 per cent concentrated spent sulfite liquor per hour while the other will burn oil and bark. Capacity of the present plant for burning sulfite liquor of this concentration is 13,600 lbs. per hr.

C-Z Experiments With Bagasse

Crown Zellerbach Corp.'s Central Research Department in Camas, Wash., has started up a pilot plant to make paper pulp from Hawaiian sugar cane residues. The plant is designed to determine the commercial feasibility of utilizing bagasse as a raw material for paper manufacture in Hawaii.

It is expected that the Camas pilot plant will be producing bagasse pulp in quantities for test runs on commercial machines at CZ's Camas and West Linn divisions. A ton of bagasse is expected to yield about one half ton of paper.

The bagasse developments now underway are the culmination of nearly seven years of laboratory work and study by the Hawaiian Sugar Planters Association and Crown Zellerbach.

Thurso Installs New Turbine

De Laval Steam Turbine Co. of Trenton, N. J., has designed and built an unusual new turbine and an intricate control set-up Thurso Pulp & Paper Co. of Thurso, Quebec.

This turbo-generator was installed at Thurso's new 200-ton-per-day bleached kraft pulp mill.

Major design conditions included: wide shifts in electrical load from weekday to weekend, summer to winter, varying in a ratio of 10-1; and periodic, instantaneous drawdowns of 60,000 - 100,000 lbs per hr from a total steam capacity of 300,000 lbs per hr for process use.

Chesapeake Announces Expansion

A program of improvement and expansion, estimated to cost more than $3,000,000, will be carried out in 1959-1960 by Chesapeake Corp. of Virginia, West Point, Va.

A large warehouse designed to store 10,000 tons of kraft paper and paperboard products is now under construction. Installation of a 12,500-kilowatt turbine generator to increase the power plant's capacity is expected to be completed in August, 1960.

Rebuilding eight of the digesters is also planned in the improvement program along with other specialized equipment to improve the quality of the company's market pulp.

Union Bag to Build Corrugated Box Plant

Union Bag-Camp Paper Corp. has completed plans for building a corrugated box plant in Spartanburg, S. C. The Plant is expected to be in production by December of this year.

Paperboard for the plant will be furnished by the Savannah plant of Union Bag.

Riegel Installs Air Jet Coater

When Riegel Paper Corp. installed its new 236-in. paperboard machine (the Carolina Belle) at its Carolina Division, Riegelwood, N. C., provisions for "on machine" coating were made to avoid the extra cost involved in transporting paperboard to independent coating equipment.

The coater, one of the largest air-jet coaters yet installed, was included in spite of the fact that not all paper and board produced on the new machine is coated. Coating equipment is arranged so that the web can by-pass it when coating is not required.

Manufactured by John Waldron Corp., New Brunswick, N. J., the coater utilizes the Waldron "Micro-jet" method of coating.

Scott Announces Warehouse Expansion Program

A Multi-million dollar warehouse expansion program designed principally to combat increasing expenditures arising from the distribution of many new brands has been announced by Scott Paper Co.

New warehousing facilities will be built in Chester, Pa., Detroit, Mich. and Everett, Wash.

A considerable degree of automation is planned for these centers. This will include expanding the use of the electric-eye selector system on the conveyors.

Puget Sound Installs Dryer

The installation of a 100,000-lb-a-day capacity spray dryer is a major part of a $400,000 expansion program at the Bellingham, Wash., mill of Puget Sound Pulp & Timber Co.

This spray dryer will be used in the production of waste sulfite liquor by-products.

Engineered and fabricated by Bowen Engineering Inc. of North Branch, N. J., the unit will incorporate a Bowen-patented design which allows introduction of cooling air into the drying chamber to cool the product prior to leaving the unit.

Endura Continues Expansion Program

Another stage will soon be completed in the broad expansion underway at Endura Corp. of Quakertown, Penn.

The latest step forward will come in early spring with the completion of a new 60-in. impregnating system which will boost capacity by more than 25 per cent and increase versatility. Already complete are doubled laboratory facilities and staff for greater services.

Michigan Carton Installs Trailing Blade Coater

The installation of a Rice Barton Trailing Blade Coater on the number three paperboard machine has been another important step in the continuing program of major improvements at Michigan Carton Co. of Battle Creek, Mich.

At present, the new coater is undergoing extensive tests and will soon be ready for production.

Michigan Carton recently completed

a highly-successful rebuild of its number two paperboard machine, incorporating seven Stevens Formers.

Stone Container Corp.
of Chicago has purchased the business of Campbell Box & Tag Co., South Bend, Ind. The operation will continue as Campbell Box & Tag Div., Stone Container Corp. Campbell is a manufacturer of folding cartons, tags and paperboard specialties.

Cornell Paperboard Products Co.
of Milwaukee, has acquired Rathborne, Hair & Ridgeway Box Co. of Chicago. Rathborne will continue to operate under its present name and management as a wholly-owned subsidiary.

Dubuque Container Co.,
Division of St. Regis Paper Co., has installed a two-color, unitized Miller-M.A.N. offset press. This is one of the many steps in modernization that are in the planned future for Dubuque Container.

Coast Envelope Co.
has completed negotiations for the construction of a new 100,000-sq-ft. factory and office building in Los Angeles. The cost of construction is said to be $500,000.

New Haven Board & Carton Co.
of New Haven, Conn. and William W. Fitzhugh Inc., Brooklyn have been merged. New Haven produces paperboard and folding cartons and Fitzhugh makes folding cartons, labels, envelopes, paper specialties and corrugated containers.

Taggart Paper Mills Inc.
has resumed production operations after a seven-month, close-down period. The mill produces mill wrappers, folder stock, tube stock and better grades of kraft paper.

Banner Fibreboard Co.
of Wellsburg, W. Va., has completed installation of a new Babcock & Wil-

cox boiler. The installation will allow better control of processing in the production of Banner's colored linerboard and other paper specialties for corrugated box makers.

Allied News Notes . . .

J. O. Ross Engineering Div., Midland-Ross Corp. has moved its Chicago offices into the company's new suburban building in Mt. Prospect, Ill. The **Hartig Extruder Div.** of Midland and the **John Waldron Corp.** (a subsidiary of Midland) have also moved their Chicago offices into the new building.

Fabrionics Corp. of Juntington, Long Island, N. Y. has been appointed exclusive sales and service agents for **Detection Inc.** of New Haven, Conn. They will handle all sales and service of the corporation's bump detector and Void Detector for paper.

The **Industrial Products Department of J. M. Huber Corp.** is now located at 630 Third Ave., N. Y.

Alloy Tube Div., Carpenter Steel Co., Union, N. J. has moved its Western regional sales headquarters from San Francisco to San Marino, Los Angeles. Harry L. Harner is western regional sales manager.

Rice Barton Corp. of Worcester, Mass., has concluded an agreement with **D. & S. Engineering Ltd.** of Vancouver, B. C., whereby Rice Barton will design and build Fibre-Flash pulp drying systems.

A. E. Staley Mfg. Co. has started on a new 108,000 sq.-ft. research center in Decatur, Ill. The project is an essential part of the long-range research expansion program launched three years ago.

Infilco Inc. has announced a comprehensive plan for leasing water, sewage and waste treating equipment, with option to purchase. The plan can be applied to many types and sizes of equipment. Full information is available upon request from Infilco Inc. Tucson, Arizona.

Hills-McCanna Co., Chicago, has announced the opening of the company's Gulf States District office at 4815 Port Arthur Rd, Beaumont, Texas. The office will service the states of Texas, Oklahoma, Louisiana and Arkansas and will be under the direction of V. M. Barber.

Hamilton Paper

(Continued from page 806)

The wet end dryers are controlled by a graduated temperature system to prevent picking and cockling of the sheet.

A moisture control system controls the steam to the main section dryers, ahead of the size press, to hold a constant moisture in the sheet going into the size press. The first few dryers after the size press are also graduated to prevent picking and cockling of the sheet coming out of the size tub. Another moisture control system controls steam to the rest of the dryers.

The drainage of the dryers is accomplished by a standard blow through system and flash tank, together with a vacuum tank held at 15 in. Hg vacuum. The size section dryers and wet end dryers drain directly to the vacuum tank, while the main section dryers discharge their condensate to the flash tank designed for automatic air venting.

The various sections of dryers on this machine take their steam, through

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- ensuring clean cut and right angled edges free from fluff and ridging even on high calipers.
- In connection with board machines, JAGENBERG's Single and Duplex Cutters provide for changing both slitter and cutter sizes during full operation; deflector for defective sheets, minimum waste.
- When used as a separate cutter (off the machine), continuous operation can be provided with the aid of brake generators, automatic web tension and edge controls, automatic web feed during roll changes.
- Automatic sheet squaring.
- All driving components enclosed in oil bath gear boxes in the side frames.
- Due to genuine shear cutting action, fly knives stay sharp for up to 3 years without regrinding.

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® JAGENBERG trade mark for two rotary fly knives synchronized with web speed during the cut.

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diaphragm valves, from a 40-lb. exhaust header which is partly supplied from the exhaust steam of the drive turbine. A recording pressure controller holds a constant back pressure of 40 psi in the turbine header by operating a 2-in., 400-lb. live steam makeup valve, in the absence of sufficient exhaust steam from the turbine.

Air supply and exhaust system

The air supply and exhaust system consists of an open hood, exhaust fans and the necessary roof supply units. The hood (divided into two sections) features Transite panels mounted in angle iron frames. The exhaust fans are mounted on the back side of the machine.

The roof supply units consist of heater coils, casing, supply fans and duct work.

Other equipment

The new finishing room facilities were expanded to add a new 100-in. trimmer, back feed, conveyors, etc.

Steam generating facilities were expanded by the addition of a 900 psi, 60,000 lb./hr. automatic oil-fired steam boiler which replaces two coal-fired semi-automatic stoker units.

Adhesives

(Continued from page 809)

found many applications based on their high strength-to-weight ratio. They are used in the manufacture of boxes and inexpensive luggage, as lining materials to stiffen corrugated boxes, as a stiffening and reinforcing sheet in the ceilings of trailer homes, as separators for cargo in ships, and for general use as dunnage material.

The main application of paper faced lumber is as a sheathing material for home construction. Since the standard panel size is 2 x 8 ft, the product offers appreciable savings in labor cost. Compared to some other sheathing materials, the paper faced lumber panels do not require "furring strips" for the application of exterior siding to the sheathing.

Kraft linerboard may be bonded to veneer either by a continuous process using a roll press, or by a semi-continuous process using a flat bed press.

The primary requirements for the adhesive used to produce either the paper faced veneer or paper faced lumber panels are that it should be relatively inexpensive, be easy to prepare and use, have a good working life, be fast bonding, and have good water resistance. Special adhesive formulations, based primarily on spray-dried, soluble animal blood, have been developed which satisfactorily meet these requirements.

Saran-lined pipe

(Continued from page 807)

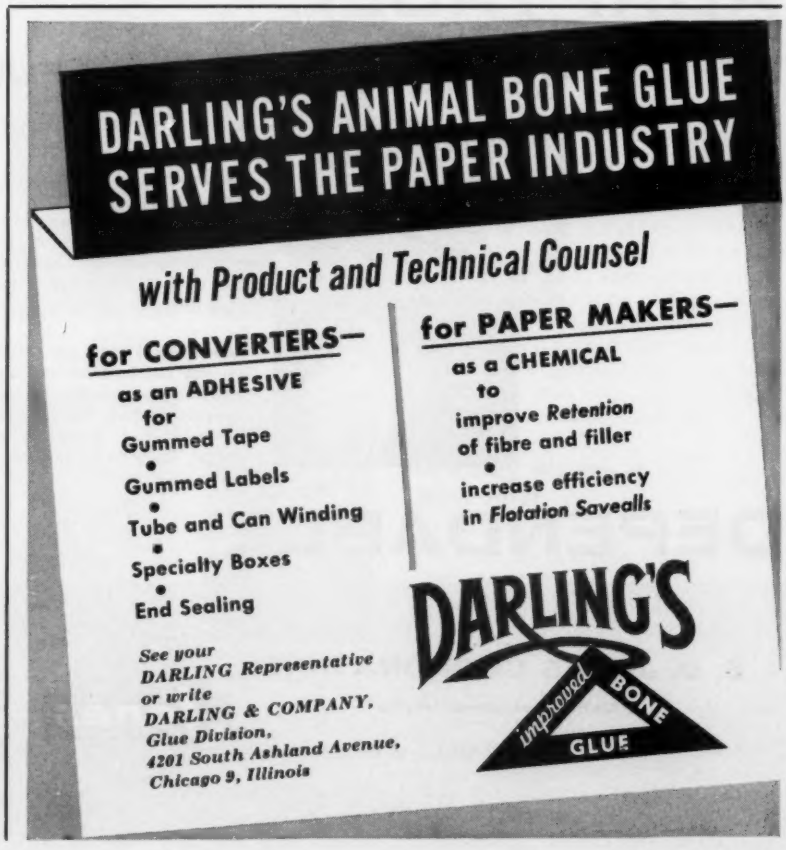
through a number of work areas, the carrier had to be reliable from a safety standpoint. And because some portions of the system would travel through pipe tunnels that are difficult to reach if a break were to occur, obvious maintenance considerations were also involved in the choice of a carrier.

Saran-lined pipe provides the answer

The answer to each of these requirements was found in a combination of plastic and steel—saran-lined pipe. Saran, a vinylidene chloride copolymer resin that is manufactured by Dow Chemical Co., is resistant to most inorganic chemicals and to many organic solvents. A saran liner is locked within a steel tube so firmly that liner and tube expand and contract as one unit.

Saran-lined pipe has been used since 1945 by Nekoosa-Edwards to carry chemicals such as calcium hydrochlorite and caustic soda. Until the chlorine dioxide stage went on stream, however, Nekoosa-Edwards had not had occasion to use an improved version of saran-lined pipe that presents such improvements as an operating temperature range from −20° to 200° F. and additional lining toughness. Those qualities provided answers to the need for thermal stability as well as the safety and maintenance requirements. The saran lining measured up as an acid-resistant carrier, and the steel casing meant that nothing more than normal support for the line was necessary.

In all, 750 ft. of two-inch saran-lined pipe was installed to carry the waste liquor. Diaphragm valves, check valves and pipe fittings were also saran lined. The result is that approximately 2000 gal. of valuable liquid travel efficiently through the piping in an average day's production operation which, in addition to being unique in the Wisconsin paper industry, is consistant with Nekoosa-Edwards pioneering tradition.



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Jones Stockmaster

Wide selection of tackle, combined with suitable rotor speed, stock flow, consistency and stock pressure, provides complete flexibility in achieving desired results. Low in initial cost. Simple to maintain. Details in Bulletin EDJ-1047.

Extended motor base available at extra cost.

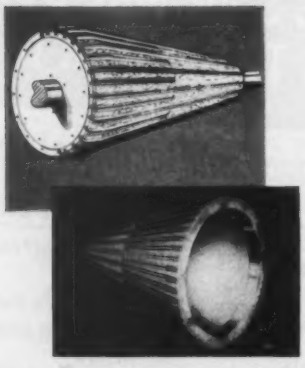
CONTROLLABLE

Jones Fibremaster

Close control of stock characteristics is assured in *all* Jones conical refiners through variety of tackle and highly accurate plug adjustment mechanisms. Split small heads facilitate dismantling. Fibremaster model is ideal general utility unit. Bulletin EDJ-1035A.

ADAPTABLE

Jones Adapta-Plug and FULBAR Shell Fillings



FIT ANY JORDAN

Adapta-Plug is the strongest, simplest Jordan plug made. Completely bandless. Easiest to strip and fill. Available as solid plug — or in sleeve form for easy rejuvenation of old worn plugs. Bulletins EDJ-1094 and 1094A.

Fulbar Shell Fillings are available in *any* bar combination and *any* bar material for *all* makes of Jordans. Easiest-to-install, rigid, one-piece construction. Famous Nowave design. Bulletin EDJ-1094.

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NAMES in the NEWS

Hinde & Dauch to Be Decentralized

Hinde & Dauch division of West Virginia Pulp & Paper Co., Sandusky, Ohio, is being decentralized to provide an organization for continuing growth.

The program calls for the formation of four regional organizations headquartered at New York, Chicago, Sandusky and Richmond, Va. They will be headed by managers who will coordinate the sales, production and administrative functions in all plants and sales areas of their regions. The managers will serve as principal members of the division manager's staff.

Frank L. Thompson became manager and chief executive officer of the Hinde & Dauch division in November, 1958, succeeding Charles E. Frohman, who resigned for reasons of health.

The region headquartered at Chicago will be managed by Charles D. Sparks. This region includes H & D box factories at Chicago, St. Louis and Kansas City.

The region headquartered at Sandusky will be managed by George T. Henderson. This region includes H & D box factories in Sandusky, Cleveland, Detroit and Eaton, Ohio.

The region headquartered at New York will be managed by John B. Wyatt. This region includes H & D box factories in Watertown, Mass., Meriden, Conn., Hoboken, N. J., Gloucester, N. J. and Buffalo, N. Y.

The region headquartered at Richmond, Va., will be managed by Louis R. Lawson Jr. This region includes H & D box factories in Richmond, Baltimore and Gastonia, N. C.

Other new appointments announced for the H & D division are: Nils F. Janson as manager of manufacturing services with overall responsibility for industrial engineering, central testing and development laboratory and machinery and equipment services; William E. Richardson as manager of administration services with overall responsibility for coordinating and directing the staff functions of personnel, accounting, cash flow and credit, purchasing and traffic; and William F. Westerhold as manager of marketing services having overall responsibility for advertising and public relations, market research and sales training.

W. E. Richardson

G. T. Henderson

L. R. Lawson Jr.

W. F. Westerhold

N. F. Janson

C. D. Sparks

J. B. Wyatt

E. H. Barnes

Barnes Retires from Michigan Carton

Edward H. Barnes, former general superintendent, has retired after more than 48 years with Michigan Carton Co. of Battle Creek, Mich. At the time of his retirement, he was the oldest person in years of service still on the payroll.

At the age of 17, Barnes joined the company as a pressroom devil. He worked his way up to the position of night superintendent of the company's board mill, then to assistant mill superintendent and in 1933 he was appointed head superintendent.

In 1948, a new mill was put into operation and Barnes was elected to the board of directors and made general superintendent of both mills—a post he held until 1953 when ill health forced him to resign. Since then, he has served as a manufacturing consultant, a director and a member of the quality control committee.

Gilman Paper Elects New President

Harold Holden, presently vice chairman of the board of Standard Packaging Corp., has been elected president and general manager of Gilman Paper Co.

At the request of R. Carl Chandler, chairman of the board of Standard, Holden will continue as a director of Standard and as a member of its executive committee.

Holden began his career in the paper industry as a chemical engineer for Falulah Paper Co., subsequently being New England manager of Paper Makers Chemical Div. of Hercules Powder Co., vice president-sales of Oxford Paper Co., president and chief executive officer of Eastern Corp. and vice chairman of the board of Standard.

Greeley Moves to New Post

Arthur W. Greeley, regional forester for the north central states, will become assistant chief of the United States forest service on March 1.

Greeley came to Milwaukee in September, 1956, to serve his position as regional forester, after having served four years as regional forester in Alaska.

As an assistant chief, he will help formulate policy and act for the chief in matters pertaining to forest protection and development, fire protection, engineering, land classification and

FLIPPING the LINT OFF "FLIP-TOPS"

Jenkins' METLKOR Web Cleaning Brush of DuPont Tynex Nylon

The gravure production plant of the Downingtown Paper Box Company, Downingtown, Pennsylvania is an engineering triumph. Here, Marlboro "flip-tops" are produced on Champlain presses at speeds up to 2400 cartons per minute.

HERE'S WHAT THE DOWNINGTOWN PAPER BOX COMPANY SAYS: Mr. George J. Wolfer, Gravure Supt. says: "Jenkins' METLKOR brushes are contributing to the overall economy and quality that is so important to our production. When we reorder brushes, they will be Jenkins' METLKORS."

HERE'S WHAT THE MANUFACTURERS OF THE CHAMPLAIN INLINE GRAVURE EQUIPMENT, OF BLOOMFIELD, N. J., SAY: "The Jenkins' METLKOR brushes used in the web cleaning process of our Champlain inline gravure equipment are superior in performance and efficiency and are providing satisfactory and economical operation for our customers all over the world."

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the original . . . the best *Metal Core* brush

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Names in the News . . .

boundary determinations on the 181 million acres of national forest lands. Greeley succeeds Howard Hopkins, who retired July 1.

M. M. Nelson, now stationed at the Washington, D. C., headquarters as a deputy assistant chief in charge of natural resources management, will move to Milwaukee to take charge of the national forests in the nine state region.

Rex Paper Elects New Officers

Rex Paper Co., Kalamazoo, has recently elected the following officers: Paul Butler as chairman of the board; J. E. Lean as president and general manager; J. M. Birely Sr. as treasurer; J. G. Ruimveld as secretary; H. W. Reiher as assistant secretary.

The office of executive vice president heretofore held by J. E. Lean has been vacated.

H. G. Nendorf will continue as general superintendent of the mill and J. G. Ruimveld will continue as purchasing agent.

Clarke Elected VP

E. Way Clarke, who has been associated for nearly 45 years with Knowlton Brothers, Watertown, N.Y., has been elected a vice president of the firm.

In his new capacity as a vice president, Clarke will continue his present position as production manager and purchasing agent. He has held this position since 1941.

Allied Personalities

Chester G. Landes will now serve as technical director of Wica Chemicals Inc., Charlotte, N. C. Landes was previously at the Stamford Research Laboratories of the American Cyanamid Co.

Calvin A. King has been elected president of Bird Machine Co., South Walpole, Mass. He will succeed **F. K. Becker.** King has been associated with Bird for 13 years. He was placed in charge of the Bird Research and Development Center at the time it was built, staffed and equipped.

Huyck Felt Co. of Rensselaer, N.Y. has announced the appointment of **Otto Berggren** as field service engineer for eastern New York and portions of Vermont. He previously worked in Huyck's development department.

J. O. Ross Engineering of New York (Division of Midland-Ross Corp.) has announced the appointment of **David R. Alexander** to its sales staff. He will make his headquarters at the Boston office of Ross Engineering. This office is under the guidance of **Frank W. Partsch,** vice president, and covers the New England territory.

Necrology . . .

Joseph A. Quinlan

Joseph A. Quinlan, a paper manufacturing executive and an officer and director of several railroads, died in January.

Quinlan was vice president in charge of traffic and a director of the St. Regis Paper Co. in New York. He was a director of three subsidiary companies of St. Regis, and president and director of the Norwood & St. Lawrence Railroad Co., controlled by St. Regis.

In addition, he was a director of the Rutland Railway Corp. and the Lehigh & New England Railroad Co.

Ralph A. Masten

Ralph A. Masten, manager of the International Paper Co.'s mill at York Haven, Pa., died in January.

A graduate of Worcester Polytechnic Institute in 1923, he joined International Paper in 1926 as an engineer at the Glenn Falls office. Masten was appointed manager of the York Haven mill in 1940.

John Willem

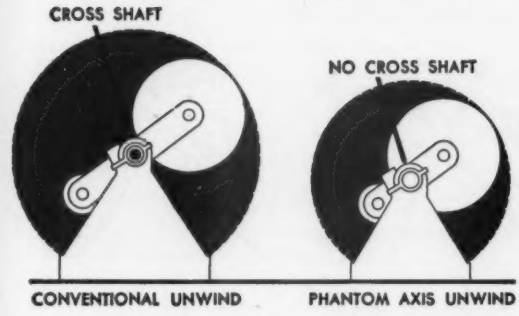
John Willem Sr., a retired vice president and general manager of the Sielaff Paper Co., Milwaukee, Wis., died in January. He was vice president and general manager of the company from 1922 until 1948, when he retired.

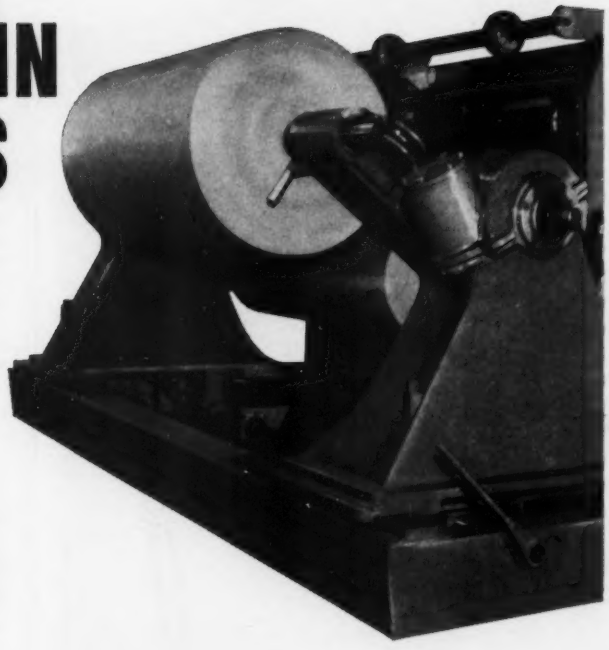
Alexander Smith, former president of Abitibi Power & Paper Co. Ltd., Iroquois Falls, Ont., died in January.

Leroy Hoel, development engineer for the research development division of Kimberly-Clark Corp., Kimberly, Wis., died in January.

ANNOUNCING... A NEW ADVANCE IN TURRET UNWINDS

EGAN PHANTOM AXIS* TURRET UNWINDS





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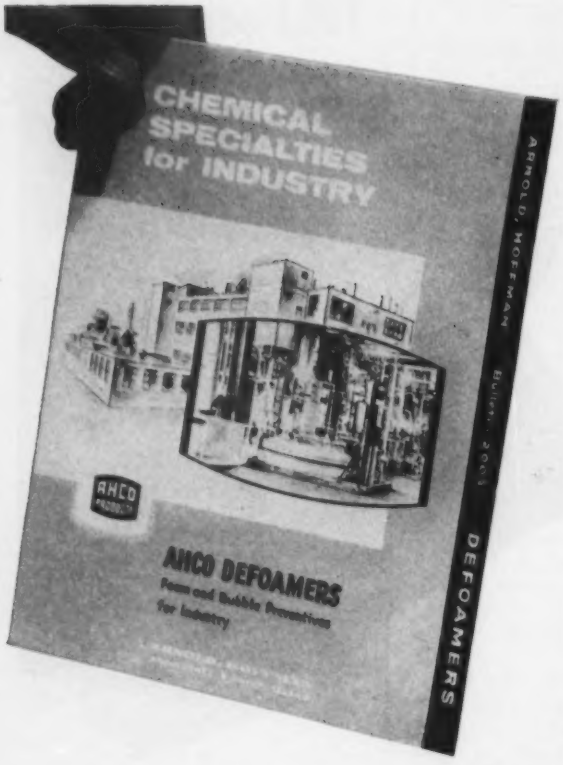

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691-8

FOREIGN ABSTRACTS

NSSC pulp from mixtures of birch and spruce

Experience has shown that hardwoods are better raw materials for producing neutral sulfite semi-chemical pulps than softwoods, but at times the use of certain amounts of softwoods may be necessary. Apparently, the differences in the papermaking properties of spruce and birch NSSC pulps (at 80 per cent yield) are due to morphological factors which control their response to beating. At this high yield, birch pulps are beaten readily, whereas the high yield spruce pulps remain almost unchanged by normal beating in a PFI mill. This is shown in Fig. 1 — spruce NSSC pulp is on the left and birch NSSC pulp is on the right. The former attained 12° S-R, the latter 43° S-R. The spruce remains tough and unswollen.

The birch fibers lose an outer "coat" by peeling, leaving the exposed carbohydrate material which swells. Spruce NSSC fibers,

Fig. 1

however, offer an advantage when added up to 30 per cent, provided a sheet with good bonding properties can be formed without excessive beating. In this way, a corrugating medium has been obtained — that is at least as good as that formed from birch NSSC pulp alone.

One table, five figures and two references are given. H. P. Dahm. *Norsk Skogind,* **12,** No. 11, 405-10 (1958), in English.

Pulp bleaching problems

The chlorination of sulfite pulps at 5°-15° C. and also at 20°-45° C. was studied. The hardness of the pulp decreased only slightly by increasing the temperature from 5°-45°. At 20° (or above), slight decreases in viscosity were noted. It appears that below 20° the residual lignin in the pulp is rapidly chlorinated, and that above this temperature the rate of oxidation increases.

When 25-60 per cent excess of chlorine (beyond the required minimum) was used, the bleaching period was shortened by 20-40 per cent and the resulting pulps were brighter. When the chlorine was used in excess of 60 per cent (over the minimum) and the chlorine concentration was 0.61 g/liter, the resulting bleached pulps showed lower viscosities and alpha-cellulose contents. There was no apparent correlation between the viscosities of the bleached and unbleached pulps.

The authors suggest that lowering of pulp viscosity during the hypochlorite stage is determined not only by the initial viscosity but by structural (and other) properties of the cellulose, and that the heterogeneous nature of the bleaching medium may also be a factor.

F. P. Komarov and Z. D. Kuz'mina. *Referat, Zhur Khim* No. 14, 501 (1958), in Russian, through *Abstr. Bull. Inst. Paper Chem.* 29, 659 (1959).

Determination of percentage of birch fibers in mixed pulps

A study was made of the possibilities of using the Bauer-McNett Classifier in determining the approximate percentage of birch fibers as well as softwood fibers in mixed pulps. Apparently, by a suitable combination of wires (*i.e.* 14, 20, 35 and 100 mesh), the percentage of birch could be determined with sufficient accuracy through a calculation based on results obtained by fiber fractionations carried out with "pure" and with mixed pulps.

Samples used were commercial bleached pulps — spruce sulfite, pine and birch kraft, and birch sulfite (all in the unbeaten state). Ten gram samples were employed and the fractionations required 20 min.

The sulfite (softwood) pulps were made up by introducing 5, 10, 50, and 90 per cent birch pulp. The kraft pulps contained mixtures of 10 and 90 per cent birch. Calculations based on a specific equation were compared with the amounts of birch pulp actually present.

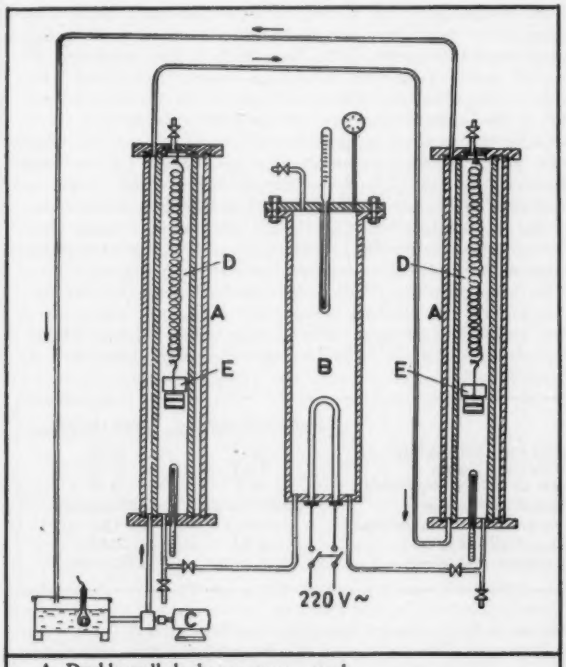
The equation used was $x = 100\ (c - b)/(a - b)$, where x = percentage birch in the mixture; a = size of the fraction found in fractionating the birch pulp; b = the size of the corresponding fraction from the fractionation of the softwood pulp; and c = the size of the corresponding fraction obtained by fractionating the pulp mixture.

The first three fractions (i.e. on 14, 20, and 35 mesh screens) gave no accurate picture of the true birch content. But, the birch fiber fractions, calculated on the basis of the fourth fraction, closely approached the amounts of birch in each of the various mixtures, even when the birch content was low.

Results are given in four tables. Y. Hentola and N. Sihtola. *Paperi ja Puu* (Finland), 40, 569-570 (1958), in English.

Penetration in the sulfite digestion

A study was made of the rate of penetration of sulfite cooking liquor into spruce headwood chips using a quartz spiral balance (shown in Fig. 2). The influences of steaming time, hydrostatic pressure, chip-moisture, temperature of the cooking liquor and sulfur dioxide content were all studied.



A. Double-walled glass pressure vessel.
B. Stainless steel vessel for heating sulphite cooking acid.
C. Circulation-pump for polyethylene glycol to keep penetration equipment at desired temperature.
D. Quartz spiral balance.
E. Chip.

Fig. 2

Penetration is greatly facilitated by pre-steaming and by impregnation under pressure. When no hydrostatic pressure was applied (especially with unsteamed chips), the penetration was often inhibited by gas evolution. High moisture content of the chip favored penetration. The effect of temperature on penetration was determined by the change in liquor viscosity and by the difference between the total pressure and the pressure of the cooking liquor.

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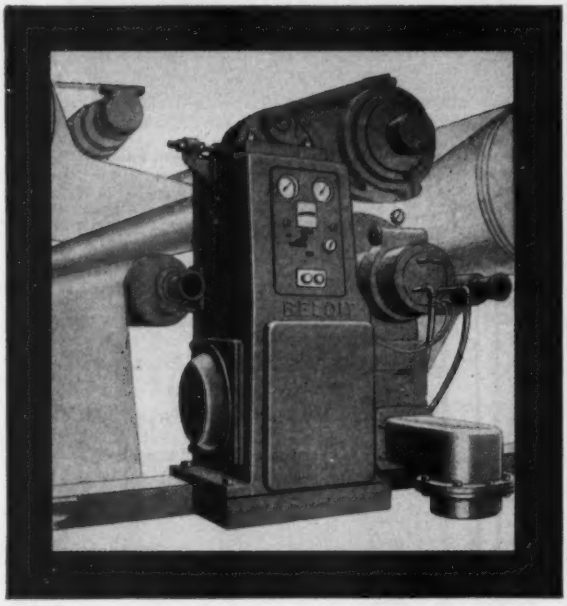

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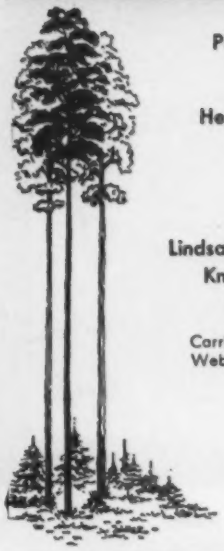

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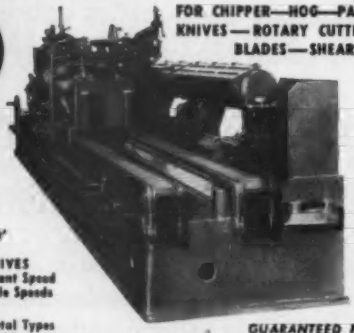

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The sulfur dioxide content does not appear to affect the rate of penetration significantly, and neither do the pressure pulsations show any important advantages over a constant hydrostatic pressure. A suitable combination of pre-steaming and pressure impregnation can lead to complete and rapid impregnation even in large commercial digesters, and should permit a shorter cooking cycle and more uniform pulping.

Four references, 10 figures and two tables. R. Aurell, L. Stockman and A. Teder. *Svensk Papperstidn.* 61, 937-44 (1958), in Swedish with English summary.

Hydrotropic pulping

An extensive study of hydrotropic pulping was carried out at the Institute of Technology in Darmstadt after critically evaluating the literature, with special emphasis on the work of Ralph McKee and his co-workers. The digestions were made with bagasse (freed from pith).

The pulping liquor used was 30 per cent sodium xylene sulfonate (termed "Naxonate"). The liquor to bagasse ratio was 6:1. Three series of digestions were made: (a) with a maximum temperature of 160° and with gas relief, (b) with a maximum temperature of 175° and gas relief, and (c) carried out as in (b), but without relieving the digester. In all of these, the time schedules were varied, and it was shown that the maximum delignification occurred at maximum temperature within 30-120 min. Thereafter, the removal of hemicelluloses was very marked, and the resulting pulp was weakened.

Apparently Naxonate frees acids during the cook. The pH drops (sometimes as low as 4.0) and the xylans in the bagasse are degraded to lower polymers and to xylose. No glucose was found in the spent liquors. With very extensive digestion, the resulting pulps were extremely weak. Relationships between cooking time, temperature and digester relief were studied. The conclusion was reached that McKee's pulps must have suffered from hemicellulose hydrolysis and had very low strength properties. Certain discrepancies in the literature were also explained and harmonized.

Under the usual mild cooking conditions, the strongest pulps were formed at 160°, provided there was digester relief as well. However, the best pulps were obtained when about 4 per cent NaOH as well as the Naxonate were used in the cooking liquor, so that at the end of the cook the pH was about 8, instead of the usual 4.0-4.9. Only when NaOH was used did the hydrotropic pulps show properties approaching those of kraft bagasse pulps.

In the table which follows, the best (unbleached) hydrotropic pulp formed with gas relief is compared with a pulp obtained with both NaOH and Naxonate, without relieving the digester. The importance of NaOH addition becomes obvious. In either case the time to reach maximum temperature was 90 min., with 2 hrs. maximum at 160°. The pulps were then beaten to 35° S.R. before making strength tests. Results are discussed.

	Without NaOH	With NaOH
Per cent total yield	56.5	60.4
Per cent Lignin	9.88	7.10
pH at end of digestion	4.9	8.1
Breaking length	5500 meters	7200 meters
Internal tear resistance	115	125
Burst (kg/sq. cm)	2.75	3.52
Folding endurance	233 folds	541 folds

More screenings, were obtained when NaOH was present than in its absence.

Eight tables, eight figures and 48 references were given. G. Jayme and Karl-Heinz Rosenbock. *Wochbl. Papier fabr.* 86, 1009-1018 (1958), in German.

Mullen bursting strength determination on corrugated board

Five different laboratories cooperated in determining the accuracy of corrugated board burst tests. The results are described by staff members of the Swedish Packing Research Institute, who issued instructions for carrying out the tests.

Reproducibility for individual testers was approximately 6-9 per cent; but, between different Mullen testers, this rose to 19-36 per cent. Apparently, the reproducibility is so low, that if two grades

of board should show bursting strength differing by less than 36 per cent, the results might be meaningless.

The authors show that, theoretically, an increase in the number of replicate determinations does not affect the precision significantly. In fact, the usually accepted number of replicates (*i.e.* 20) could be reduced to 10 without affecting the accuracy of the test.

The reasons for the rather wide variations may be due to the test surface, pumping speed, membrane deflections, manometer readings, conditioning and (especially) clamping pressures. Although instruments have been calibrated carefully (at the Central Laboratory of the Swedish Paper Mills), there is no assurance that the values will be unequivocal for different testers.

On the other hand, regular calibration of the testers is a primary essential. The Mullen test for board is less satisfactory than that for paper and is more sensitive to clamping pressure. An appendix gives detailed directions for determining corrugated board-burst strength.

Hans O. Brynhildsen and Yngre Dagel. *Svensk Papperstidn* 61, 931-6 (1958), in English. Six references, four tables and one figure.

Performance of acid towers

This performance was studied in three Soviet mills using either the Mitscherlich single-tower or the Jenssen two-tower system with the object of determining the efficiency of sulfur-dioxide absorption and of limestone solubilization.

In all towers, the lower part of the limestone column, just above the grate, was found to contribute little to the formation of the acid. It was only on the first day of the working cycle that maximum sulfur dioxide absorption was noted at the lower end of the column, and in subsequent days, maximum absorption was shifted slowly upward. Apparently, this was due to clogging and to a decrease in the surface area presented by the limestone reacting with the sulfur dioxide. This caused losses of sulfur dioxide up to 25 per cent in the single strong acid tower system.

In the Jenssen system, the sulfur dioxide losses were only about one per cent. Solubilization of the limestone occurred only in the middle portion of the column; the upper portion behaved like inert material, and in the authors' opinion should actually be replaced by Raschig rings to assure a large contact area between sulfur dioxide and water. This necessitated the installation of a second grate, but permitted a decrease in the height of the limestone column to 20-22 meters and also facilitated the cleaning and the refilling of the tower. In the weak acid tower, the authors think that the inert material should replace the limestone completely.

Two tables, 14 figures and eight references. Y. N. Nepenin and M. A. Burenin. *Bumazh. Prom.* 33, No. 1, 4-8 (1958) (original in Russian); through *Abstract Bulletin. Inst. Paper Chem.* 29, 419 (1958).

Chestnut tree utilization in Italy

The author gives a review which includes the physiological characteristics of the chestnut; its geographical distribution and cultivation, and statistical data on its production and utilization in Italy, during the past twenty years.

In view of the spread of chestnut diseases, its cultivation as a fruit tree is being gradually curtailed, and the utilization of the younger trees (in the age range of 5-40 years) for tannin and timber is now increasing. The wood contains 27-30 per cent cellulose, 15-19 per cent pentosans and about 13 per cent tannin. Extraction of the latter is described.

In Italy about 273,800 cubic meters of this wood is used annually in tannin production, and the resulting chips are used as fuel for producing the steam that is required in the manufacture of the tannin extracts. At present, the manufacture of furfural from chestnut wood has also begun, and the manufacture of paper pulp is at least being investigated. In France, bleached chestnut soda pulp is being used as a paper-making material in admixture with long-fibered pulps. In Italy, (until the mill was closed in 1954) board made by the Masonite process and semichemical pulp was manufactured from chestnut wood chips. Laboratory data, coupled with this rather limited Italian industrial experience, would indicate that extracted chips can and should be used in the paper industry in view of the shrinking market for chestnut tannins and the growing shortage of paper-making materials.

Gianfranco Bensi. *Cellulosa e Carta* 9, No. 6, 3-19; No. 7, 9-25 (1958) (original in Italian with English summary); through *Abstract Bulletin. Inst. Paper Chem.* 29, 421-22 (1958).

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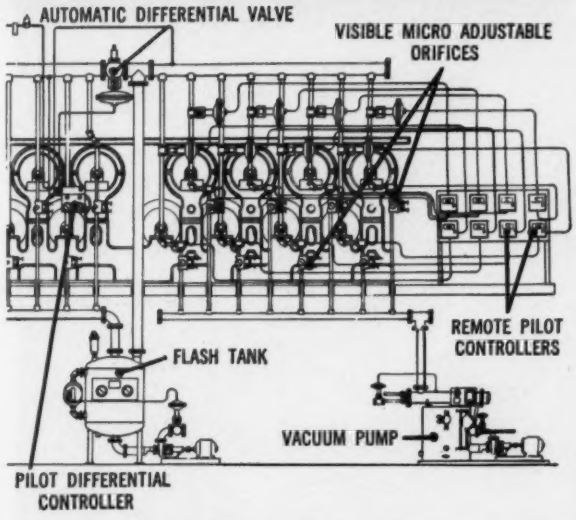

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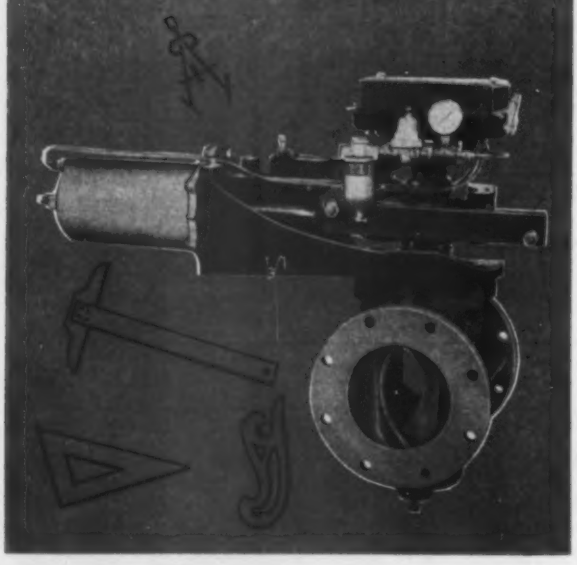

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PATENT REVIEWS

MELVIN NORD*

Nitrogen-containing lignins

U.S. 2,842,534, issued July 8, 1958, to Joseph B. Doughty and assigned to West Virginia Pulp & Paper Co., relates to the reactions between lignin and ethyleneimine to produce nitrogen-containing lignins that are useful as fertilizers.

The reaction proceeds by merely mixing the two reactants together, since lignin is soluble in ethyleneimine.

Stock inlet system for a papermaking machine

U. S. 2,847,913, issued August 19, 1958, to Anthony J. Cirrito and assigned to Rice Barton Corp., provides an inlet for supplying paper stock to a paper machine under controlled conditions of uniform velocity and fiber distribution across the width of the machine so as to impart uniformity to the sheet or web being manufactured.

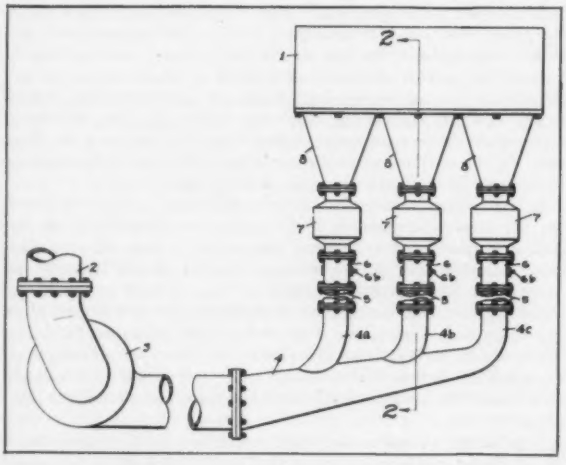

Fig. 1

As shown in Fig. 1, the stock distributor consists of a number of identical parallel sections. The pump 3 discharges the paper stock into a cross-flow manifold 4 to which the branch pipes 5 are connected. The shape of this manifold is tapered relative to the positions and number of branch pipes 5 in such a manner that the velocity of the stock flow at any portion of the manifold is constant. Also, the shape of the manifold is sufficiently streamlined so that when the stock is flowing at the desired velocity any difficulties due to settlement of stock will be eliminated.

The invention provides means for measuring and compensating for flow variations between the several branch pipes 5. In each branch pipe 5, the measuring and compensating means consist of a control valve 6 for permitting minor flow adjustments and a flow meter 7 for accurately measuring the rate of flow. An automatic controller, pre-set at a given control point, coordinates the reading of each flow meter with its corresponding control valve so as to provide a constant even flow in each pipe 5—thus eliminating the need for manual control.

At the upper end of each branch pipe 5, beyond the meter 7, a flow spreader 8 is connected for changing the cross-sectional shape of the flow stream from circular to that of an elongated rectangle. Accordingly, the lower end of each flow spreader 8 is circular and of the same cross-sectional area as branch pipe 5; the upper end of each flow spreader 8 is also equal in cross-sectional area to that of the branch pipe, although the shape has been changed to an elongated rectangle.

*Patent attorney, 17600 Pinehurst, Detroit 21.

Thus, as the flow stream changes its shape in spreading out, there is no change in the overall velocity since the cross-sectional area is constant.

Digestion of wood

U.S. 2,849,315, issued August 26, 1958, to Gustaf Haglund, discloses a two-stage process for the digestion of wood by the sulfite method.

In the first stage, and at a relatively low temperature, wood chips are cooked with a cooking liquor containing a considerably greater amount of base than that required for carrying through the digestion. When the lignin has been sulfonated and the chips have been soaked through, softened and settled to a considerably smaller volume, a quantity of the cooking liquor is drawn off so that the remaining cooking liquor just covers the settled wood. In this cooking liquor drawn off only a comparatively small amount of the base has been consumed.

The digestion is then followed up in a second stage at a higher temperature, with the liquor remaining in the digester. The liquor used in the first stage should contain enough base for both stages of the digestion. In the second stage, a larger amount of the base is consumed.

The liquor drawn off from the first stage is directly re-used in a subsequent first stage—thus constituting a substantial saving in chemicals and heat.

In addition, there is a further saving in heat, because a smaller amount of cooking liquor (in the second stage) must be heated to the higher temperature needed for completing digestion.

Couch roll structure for papermaking machines

U. S. 2,852,986, issued September 23, 1958 to Arthur W. Western and Walter Taylor and assigned to Empire Paper Mills Ltd., relates to devices for supervising the position of "draw" of the wet paper web from the forming belt or wire.

The present invention provides a supervisory device for continuously indicating the position of draw so that deviations are immediately made known.

A low-pressure chamber communicates with the interior surface of a suction couch roll at a detecting position in the region of the required position of draw. In operation, air enters the chamber whenever the couch roll, at the detecting position, is not covered by the paper web. The resulting change of pressure in the chamber provides the desired indication.

Production of sulphite acid

U.S. 2,858,192, issued October 28, 1958, to Gustaf Haglund, relates to the manufacture of acid-cooling liquor for use in sulfite digesters to obtain pulp, and is particularly concerned with the strengthening of raw acid liquor produced in conventional plants by the aid of SO^2—containing gases, emanating periodically from such digesters.

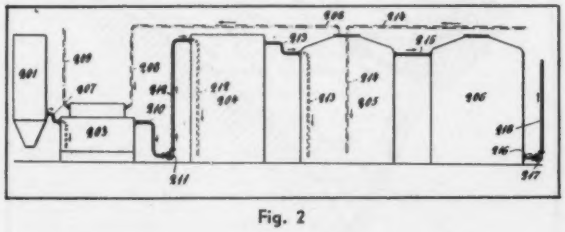

Fig. 2

As shown in Fig 2, the raw acid liquor from apparatus 201 flows through pipe 207 to absorption apparatus 203. Discs are rotated rapidly and the bulk of liquor is thereby caused to circulate in the tank and the liquor is brought into intimate contact with the gas supplied to the absorption apparatus through the gas conduit 208. Absorption apparatus 203 is dimensioned to hold a quantity of accumulated raw acid which bears a fixed relation to that amount of SO^2 which is to be absorbed from the gas emanating from the digester during a fixed period. Acid is drawn off through pipe 210 to settling tank 204, where sludge may settle, and further to reclaiming tank 205. In this tank, the liquor meets

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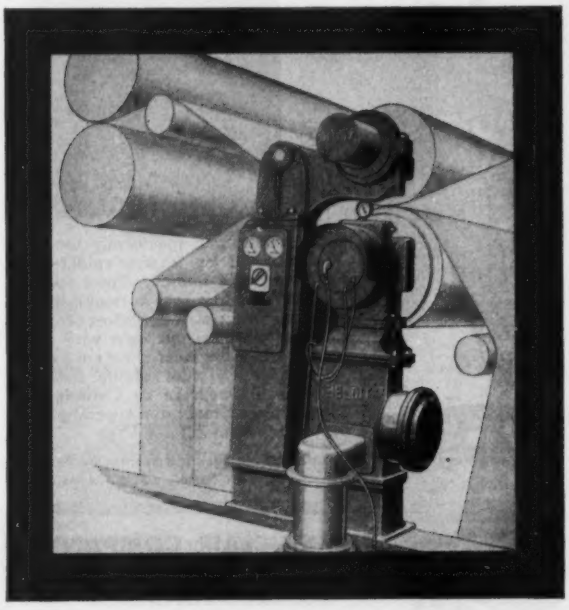

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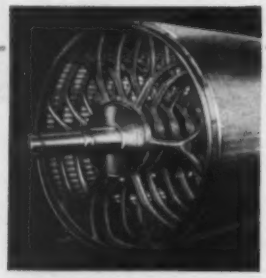

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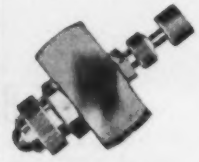

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Patent Reviews . . .

the relief gas, rich in SO^2 and cooled down to 90°C., but it still has a considerable pressure above atmospheric, so that it can be passed down to the bottom of tank 305 through gas conduit 214 and be distributed into the meeting liquor. A large portion of the gas, delivered into reclaiming tank 205, will not have sufficient time to be absorbed, but will pass through the liquor and escape from tank 205 through pipe 208. This gas, passed through, has a temperature of about 60°C., but its pressure head will not suffice to force the gas deep into a reclaiming tank. However, the gas from the reclaiming tank is passed to absorption apparatus 203.

The liquor is strengthened in apparatus 203 only to such a value that its further strengthening in reclaiming tank 205 brings it to the desired strength of finished acid cooling liquor.

Kraft pulping process for bagasse

U.S. 2,854,334, issued September 30, 1958, to Samuel B. Knapp and James D. Wethern and assigned to Hawaiian Development Co. Ltd., describes a rapid process for the pulping of bagasse and other fibrous, non-woody, lignocellulose-containing plant materials by a modified kraft procedure.

It has been found that by carefully controlling the reaction conditions, the cooking period may be reduced to an overall time of about 10 min. This prevents the degradation of the cellulose and produces a pulp which is exceptionally strong and readily bleachable.

The process starts by forming a mixture of the plant material and an aqueous digesting agent containing NaCH and Na_2S, having a ratio of liquor to oven-dry plant material of from 2:1-15:1 and a sulfidity of 15-35 per cent. The combined amount of NaOH and Na_2S is from 6-20 per cent, based on the weight of oven-dry plant material.

The mixture is heated under pressure to a temperature of 140-210° C. over a period of up to 15 min. and thus maintained for a period of up to 5 min.

Apparatus for coating paper

U.S. 2,855,895, issued October 14, 1958, to Thomas C. Burns and William H. Marvin and assigned to Champion Paper & Fibre Co., describes an apparatus for coating paper that substantially reduces the occurrence of streaks in the finished paper, and thereby makes higher operating speeds commercially possible.

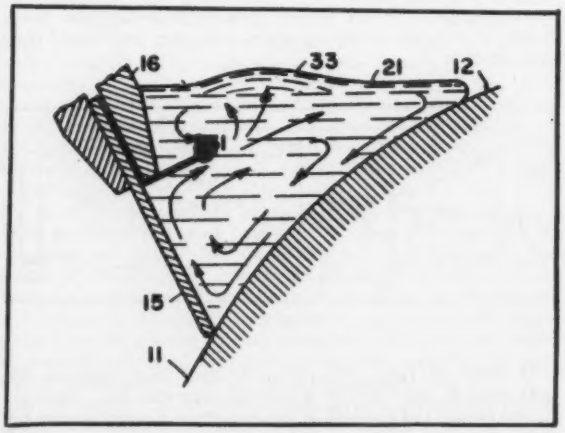


Fig. 3

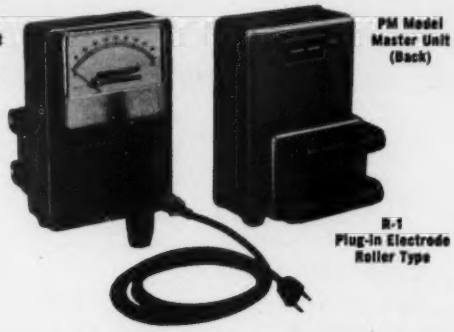
In Fig. 3, paper web 11, carrier roll 12, doctor 15 and holder 16 are shown. A new element, baffle 31, which has been added, is shown as clamped in holder 16 along with doctor blade 15. The effect of baffle 31 on the circulation of the fluid coating composition in pool 21 is indicated by arrows, which show how the up-

wardly-flowing coating stream is deflected by baffle 31, and directed back towards the relatively quiescant coating material in the center of the pool before it reaches the upper surface where it appears as a "boiling up" of substantially less intensity than in the absence of baffle 31. With this arrangement, the number of streaks appearing on the finished paper at any given speed is greatly reduced or entirely eliminated.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Bale presses for paper, rags and peat	Einar J. J. Johnson	2,848,940	8/26/58
Container coupler	American Can Co.	2,849,110	"
Article carrier	Lengsfield Brothers Inc.	2,849,111	"
Paperboard carrier having embossed-end edge portions	Mead Atlanta Paper Co. Inc.	2,849,112	"
Press for corrugating cardboard sheets	J. Robst & Son S. A.	2,849,235	"
Treatment of spent sulfite liquors	Permanente Cement Co.	2,849,314	"
Packaging insert for packing box	Secretary of the Army	2,850,155	9/2/58
Dispensing box for sheet wrapping material	Dow Chemical Co.	2,850,157	"
Carton	King Sales & Eng. Co.	2,850,159	"
Cellular bottle carrier	Karry-All Inc.	2,850,205	"
Collapsible carry carton	Steve Pasjack	2,850,206	"
Carrier cartons	New Haven Board & Carton Co.	2,850,207	"
Package	Pneumatic Scale Corp.	2,850,222	"
Unitary carrying tray	Crown Zellerbach Corp.	2,850,223	"
Tray box for small bakery products	Crown Zellerbach Corp.	2,850,224	"
Papermaking machines	Beloit Iron Works	2,850,951	9/9/58
Calender stack with individually-supported rolls	Beloit Iron Works	2,850,952	"
Method for initially flexing foldable paperboard carton handles	Mead-Atlanta Paper Co.	2,850,853	"
Set-up machine	Federal Paper Board Co. Inc.	2,850,954	"
Display tray blank & container	Rolf A. Samsing	2,851,208	"
Shallow wall automatic box	Bergstein Packaging Trust	2,851,209	"
Carrying carton for cans	Alphonse J. Kramer et al.	2,851,210	"
Boxes having reversible handles	Bergstein Packaging Trust	2,851,211	"
Opening device for bags	Delphin J. Parmer	2,851,212	"
Preparation of semi-chemical cellulose	Zellstofffabrik Waldhof	2,851,355	"
Ink receptive oil transparentized paper	The Standard Register Co.	2,851,378	"
Hydrolysis of wood waste	Walter L. Schmidt	2,851,382	"
Stone mounting for pulpwood grinder	Harvey F. Metzig et al.	2,851,830	9/16/58
Machine for wrapping rolls of paper	Kalamazoo Vegetable Parchment Co.	2,851,839	"
Means for making paper box blanks in multiples	W. J. Bradford Paper Co.	2,851,933	"
Means for making paper partitions	W. J. Bradford Paper Co.	2,852,074	"
Carton	American Can Co.	2,852,133	"
Folding paperboard box construction	Mary E. Frasch	2,852,177	"
Cover with display supporting structure	Standard Packaging Corp.	2,852,178	"
Container	National Dairy Products Corp.	2,852,179	"
Collapsible carton	Bloomer Bros. Co.	2,852,180	"
Digester strainer	Electric Steel Foundry	2,852,369	"
Blueprint paper	Keuffel & Esser Co.	2,852,377	"
Automatic steam control for papermachines	Stickle Steam Specialties Co.	2,852,860	9/23/58
Stacker for forming paper pads	Crown Zellerbach Corp.	2,852,989	"
Can holding carton	Waldorf Paper Products Co.	2,853,183	"
Car carrier	Lawrence O. Holmberg	2,853,186	"
Insulated foil-lined paper cup	John P. Gallagher	2,853,222	"
Container sealing cover	Andrew D. Paflas	2,853,223	"
Box handle and closure	Robert Slater et al.	2,853,224	"
Collapsible container	Cellu-Kote Inc.	2,853,225	"
Carton	W. C. Ritchie & Co.	2,854,181	9/30/58
Windowed carton with integral dividers	Cornell Paperboard Products Co.	2,854,182	"
Packaging and merchandising device	Jesse Strofe	2,854,183	"
Easily openable carton top	Kellogg Co.	2,854,184	"
Handled carrying bags	Interstate Bag Co. Inc.	2,854,185	"
Bag	Bemis Bro. Bag Co.	2,854,186	"
Forming wood particle board	Abitibi Power & Paper Co.	2,854,372	"
Composition consisting of lignin and diisocyanate-linked elastomers	B. F. Goodrich Co.	2,854,422	"
Oxyalkylated lignin sulfonic acid compounds	Petrolite Corp.	2,854,444&7	"

NEW INSTANT MOISTURE CHECK ON MOVING ROLLS



On moving paper rolls, on production lines, with roller type, plug-in electrodes.

D-1 Plug-in Electrode Deep Penetration (3")

S-1 Plug-in Electrode Shallow Penetration (⅛")

Other plug-in electrodes for flats, skids, rolls. Deep or shallow penetration.

Instant, accurate registration of moisture content and patterns on moving paper rolls is now possible. The PM Model is accurate in the 0%-40% range on paper, paper board and similar materials of known density. A nomograph eliminates calibration curves. Three different plug-in electrodes, automatic compensation for 90-130 volt line fluctuation, and zener diode protection add to usefulness.

Moisture Register's new portable PM Model has many features:

- Checks moving rolls.
- Multiple range settings.
- Nomograph eliminates calibration charts.
- Master Unit takes plug-in electrodes for many uses.
- Tests stacks, skids, hardboard.
- 6", 3", and ⅛" penetration with R-1, D-1, S-1 electrodes respectively.
- Easy to use, with easy-to-read 0-100 division scale.

Manufacturers of the Model 5 line of RF Instruments.

SEND FOR NEW TECHNICAL DATA and information on 2-week free trial.

ELECTRONIC MOISTURE REGISTER Instruments

Moisture Register Company, Dept. PI
P. O. Box 910, Alhambra, California

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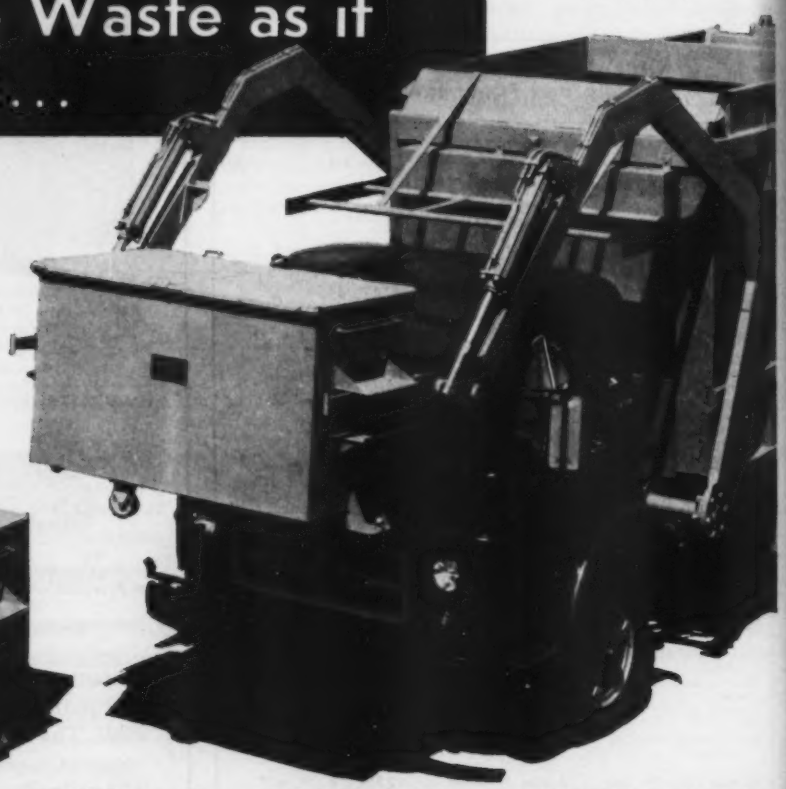
City _____ State _____

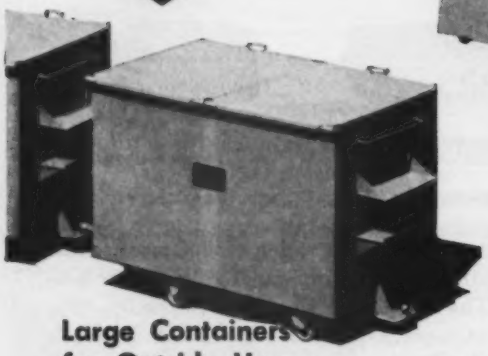
cut disposal costs by two-thirds...

Containerize Waste as it Accumulates...

Patents Pending



Small Tracking Containers for Indoor Use...



Large Containers for Outside Use...

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Self-Loading DEMPSTER-DUMPMASTER Handles 6 Sizes of Containers...

If you're using boxes, bins, cans or carts to handle or store big-volume waste and refuse, you can reduce costs by more than two-thirds with the new DEMPSTER-DUMPMASTER System of waste storage and collection.

One Dumpmaster serves any number of detachable metal containers placed at waste accumulation points. Making its rounds, the Dumpmaster picks up each container, in turn, empties the contents into its packer body and compresses the material to a fraction of its former volume assuring big pay loads on every trip to the disposal area.

The DEMPSTER-DUMPMASTER is economical! One man operation. It's safe! Clearance lifting arms never pass the cab windows, can't injure operator. Containers can be used indoors or outdoors, on ground, below grade or on a dock.

This system is also available on a monthly fee basis through a nearby DEMPSTER-DUMPMASTER equipped private hauler, (name furnished on request).

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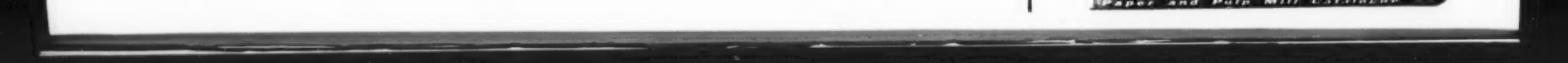
DEMPSTER DUMPSTER® SYSTEMS

Dept. PI-3 DEMPSTER BROTHERS, Knoxville 17, Tennessee


Paper and Pulp Mill Chemicals

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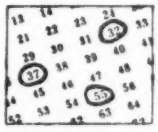

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51	52	53	54	55	56	57	58
59	60	61	62	63	64	65	66
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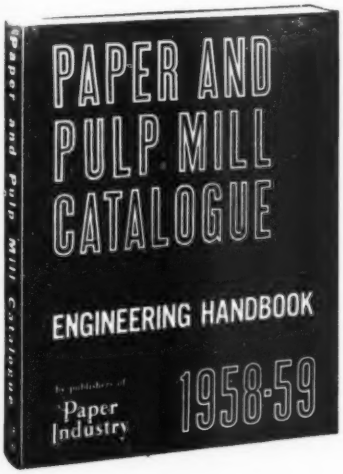

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Every operating paper and pulp mill in the United States and Canada

A one-volume, composite Catalogue or permanent classified Reference File of manufacturers' catalogues, a Buyers Service Section, and the Engineering Handbook. Published annually in September.

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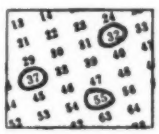

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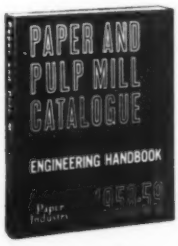
- **Engineering Handbook Section** — a compilation of practical engineering data, formulas, graphs, charts, tables, etc., including a section dealing with uses and hazards of chemicals used in pulp and paper making. New material added yearly.



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NEW PRODUCTS

These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

Air fan

A new fan, known as type AF Dynafoil fan, has been announced. Available in 13 different sizes, it is especially adaptable to mechanical draft and heavy-duty applications.

The Dynafoil fan incorporates an advanced airfoil, backward curved blade design. The wheel is built with 12 aerodynamically-shaped blades, which in combination with the streamlined contour of the inlet, permits a continuously smooth air flow through the fan. As a result, turbulence is reduced to a minimum, making the fan "highly efficient and quiet." *Clarage Fan Co.*

Circle No. 11 on Readers' Service Card

Paper machine hood

A new kind of paper machine hood, made of polyester fiberglass, has been designed. It is light weight and makes the hood easier and more economical to install. A tough and resilient material, polyester fiberglass is able to withstand severe impacts. It is said to outlive other materials because of its corrosion resistance.

Another advantage is the translucence of this material. With plenty of light coming through, employees can work with the machine more easily and safely.

The hood is custom designed to individual building and machine layout.

The hood is designed and built by Corrosion Controllers Inc. and distributed through *Mead Pulp Sales Inc.*

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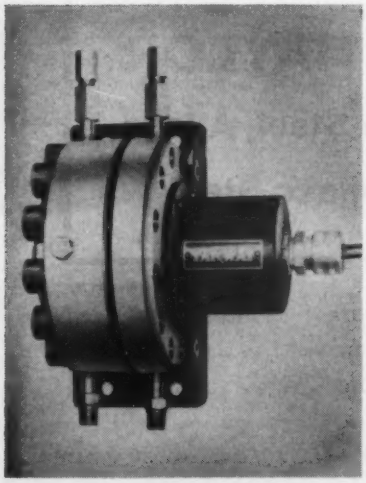


Differential pressure transmitter

A new Yarway differential pressure transmitter has been developed, operating without visual indication, controlling a distant indicator, controllor, or other electrically-operated receiving instrument.

The instrument consists of a diaphragm mechanism in a pressure housing with pressure connections at the bottom and a sensing coil for operating the remote receiver. The sensing coil is protected by a weatherproof cover.

The pressure transmitter can be mounted in any convenient location. It was reportedly proven to be dependable, fast responding, simple to install and easy to adjust without altering or replacing its working parts. *Yarnall-Waring Co.*

Circle No. 12 on Readers' Service Card

Moisture register

An ultra-sensitive moisture indicating instrument with roller-type electrode for use on moving paper rolls has been announced. The new Model PM, incorporating five stages of sensitivity, solves production line moisture measurement problems formerly beyond the capability of any single instrument.

A nomagraph accompanying each model eliminates calibration curves on papers and similar materials of known density, enabling complete percentage moisture content readings on the spot in a few seconds. The instrument gives accurate measurements in the 0-40 per cent moisture range within close tolerances. It is completely portable, weighs 5 lbs., and automatically compensates for line voltage fluctuations of 90-130 volts. *Moisture Register Co.*

Circle No. 14 on Readers' Service Card

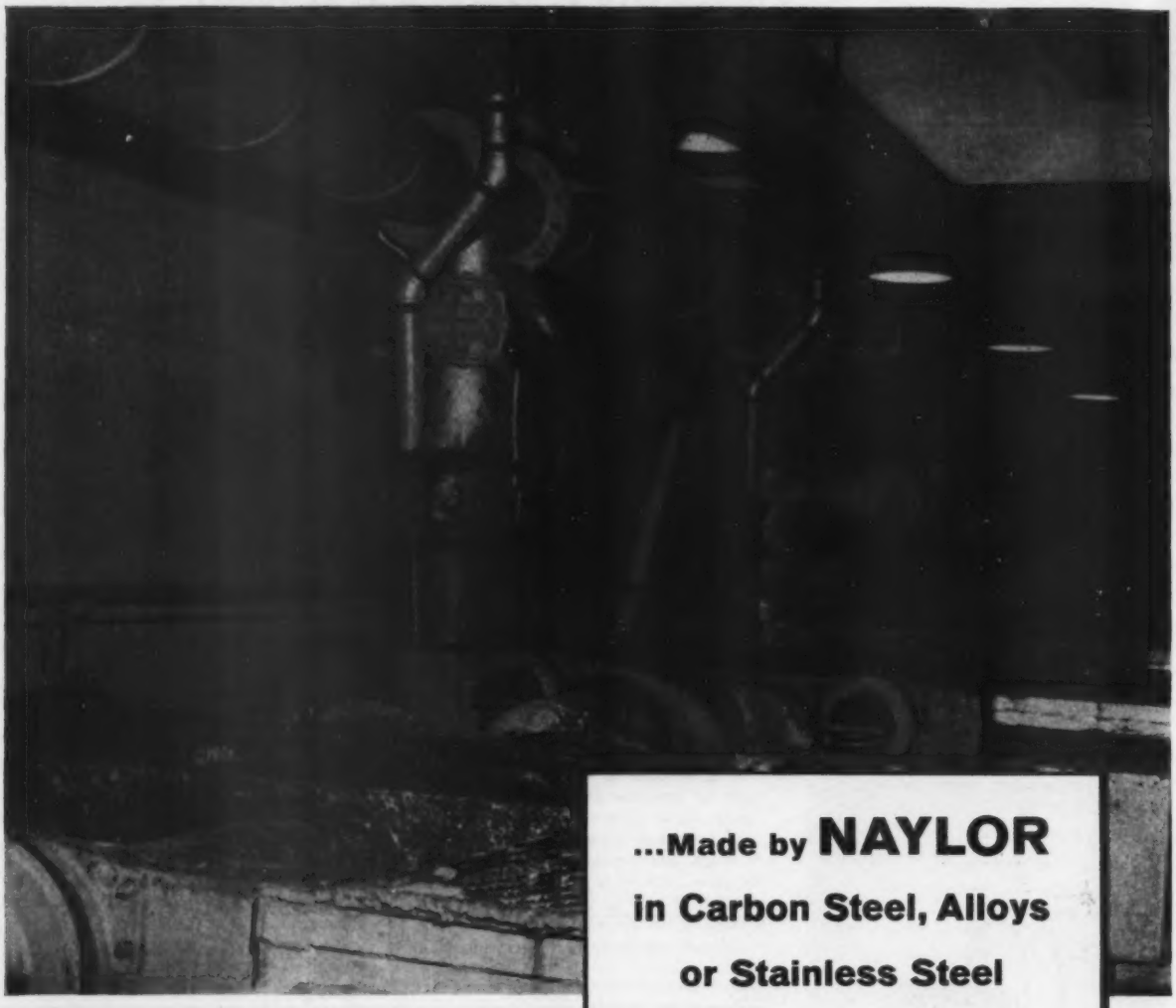
Metering pump

Four new models of metering pumps, known as the Masterline models, have been introduced to the industry.

These pumps are powered by standard NEMA foot-mounted motors. Speed reducers are kept separate from the motors in order to simplify inventories and replacement. Improved tco, is the drive mechanism. Here, because connecting rods extend 9° from the axis of the plunger, the eccentric load is held to a minimum.

The check valve assembly, designed to make the most of hydraulic principles, fea-

PIPING FABRICATIONS



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NAYLOR fabrication service can meet your paper mill piping requirements economically—no matter how exacting your specifications may be.

NAYLOR Spiralweld pipe is fabricated from carbon steel, alloys and stainless steel, in sizes from 4″ to 30″ in diameter and thicknesses from 14 to 8 gauge. Pipe, fittings and flanges are available from stock.

Write for new Bulletin No. 59 and send specifications for quotation.

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New Products . . .

tures a straight-through flow. In addition, inspection and maintenance has been simplified.

A simple stroke adjustment also makes its initial appearance with the Masterline. Manual and automatic "in motion" stroke adjustment is available as optional equipment.

The Masterline pump is well suited for application in metering starch in a continuous cooking system. A two-feed pump meters water and the starch solution at a constant ratio to the hydro heater or jet cooker. Each feed is independently adjustable, thus permitting accurate ratio control of water to starch.

Another application is in boiler water treatment. The pump accurately proportions the boiler treatment compound from the solution tank to the boiler in proportion to the amount of feed water being used. The adjustable stroke length of the pump permits change in capacity of boiler treatment as required. *Hills-McCanna Co.*

Circle No. 15 on Readers' Service Card

Acetate gums

A new series of acetate gums, tradenamed Mira-Film, is now being offered to the paper industry. Ranging from a high to a very low viscosity, these gums are reportedly effective in many varied surface sizing and coating applications.

These non-congealing gums form pastes of stable viscosity. The pastes, while having excellent flow properties, are long in character and minimize penetration into body stock. They have good water-holding properties and produce films of unusual clarity, flexibility and strength. *A. E. Staley Mfg. Co.*

Circle No. 16 on Readers' Service Card

Counter and marker

A new model of the well-known MAMCO counter and marker has been announced. This model, measuring 7½ in. wide, 9½ in. long and 6½ in. deep, can be located on a Lay-Boy or sheet piler at whatever point proves most convenient for the operator. Its controls are handy for quick adjustments.

A large central knob is used to set the counter for the number of rolls of paper being cut on the job. This knob is graduated for quick setting at number of rolls running. If a roll runs out ahead of the rest in the set, the operator turns this knob to the new number.

Another knob sets back to adjust for packets removed from the Lay-Boy for inspection and testing.

A third knob is a quick reset to "O" whenever the number of rolls being counted changes. It is then possible to start off tagging reams in accordance with new roll load on the backstand.

The main drive on this new model is a positive mechanical one from the revolving knife on the rotary sheet cutter and the actuation of the tagging heads requires only a plug-in outlet for 110 volts. *Maxson Automatic Machinery Co.*

Circle No. 17 on Readers' Service Card

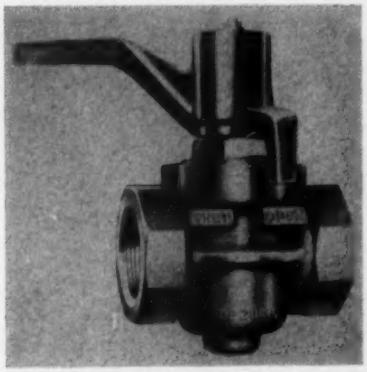
Acrylic resin

A new acrylic resin for giving dry strength to paper and paperboard is now in full scale production and available in carload and truckload quantities.

Trade-named Accostrength Resin 2386, it is reportedly effective when used in practically all grades of paper as well as container board, coating rawstock, photographic paper, liner board, file folders, folding boxboard, multi-wall bag paper, etc.

This water-soluble resin is also said to furnish faster drainage for increasing production, help retain filler and fines for better sheet formation, raise tensile and bursting strength, increase folding endurance and enable papermakers, in many instances, to cut production costs. *American Cyanamid Co.*

Circle No. 18 on Readers' Service Card



Vacuum valves

A new line of vacuum valves, designed on the eccentric principle, has been released.

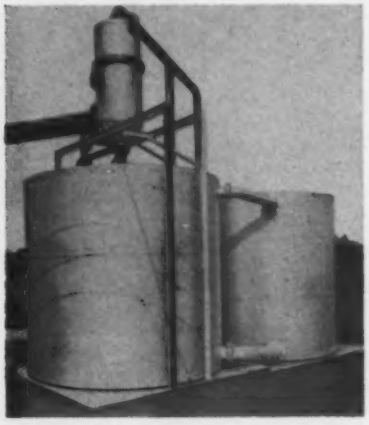
The plug, eccentric- or cam-shaped in cross-section, matches an eccentrically-raised body seat. In opening the valve, the slightest rotation of the plug breaks the contact and the valve action is free, easy and friction-less. Straight through flow and a large

Address: Dept. PA-3
KERRIGAN IRON WORKS INC. — NASHVILLE, TENNESSEE

port area assure low impedance, so necessary in high vacuum service.

Available in over 12 different alloys, these vacuum valves are manufactured in ½- through 20-in. sizes. They can be supplied for manual operation or with "on-off" or positioning actuators for automatic and remote control. *DeZurik Corp.*

Circle No. 19 on Readers' Service Card



Steam heaters

The availability of direct-contact steam heaters that economically produce large quantities of hot water by using plant exhaust steam (at low pressure or at a vacuum to 15 in. Hg) condensed in the liquid being heated, has been announced.

Besides being economical, their other advantages are minimal maintenance requirements due to their simple design and lack of moving parts; handling water containing semi-solids easily; highly efficient, continuous and fast heating of steam in liquid by condensation. Under some conditions, a temperature rise of 130°F is possible.

Although these direct-contact steam heaters have been built to capacities of 9000 gpm, custom made models are also available. Standard materials of construction are cast iron and fabricated steel. However, stainless steel is often required for paper mill service. *Schutte & Koerting Co.*

Circle No. 20 on Readers' Service Card

MAKE PAPER CUTTING EASIER With

Weld-Bilt

HYDRAULIC LIFT TABLES

"Weld Bilt"

Here's a proven cost-cutter for your paper cutting operations! A Weld-Bilt HYDRAULIC LIFT TABLE saves important time. Pays for itself in labor saving alone. Lifts a skidload of paper to cutting level fractions of an inch at a time — for just an easy SLIDE to the cutter blade, without the usual manual lifting!

There's a model to fit YOUR needs . . . in capacities from 2,000 to 10,000 lbs . . . Foot Pump or Electro-Hydraulically controlled . . . Lifting range from 6" to 50".

Write now for bulletin No. HT-357 — or for Weld-Bilt engineering aid to your lifting problems.

WEST BEND EQUIPMENT CORP.
MATERIALS HANDLING ENGINEERS
361 WATER STREET, WEST BEND, WISCONSIN

Positioning switch

A new positioning switch that provides faster and more reliable remote control of pneumatically-operated industrial processes has been introduced.

Hysteresis (the lag between a switch position change and the corresponding air pressure change) has been eliminated by using a responsive ball valve instead of a needle valve in the switch, reports the company.

The switch, including the face plate, is 2-⅜ in. wide, 3-⅜ in. high and 2-¼ in. deep. It is available for either flush or surface mounting. Body air connections are for 1/16 in. NPT. Flexible air hoses with terminal connections for ¼ in. O. D. tubes come with the switch. Three standard dial styles and optional special dial plates are available. *Powers Regulator Co.*

Circle No. 21 on Readers' Service Card

Proportioning pump

A proportioning pump for accurately proportioning general industrial fluids is out on the market. This versatile pump, called Proportioners Model 1106 Adjust-O-Feeder, has the important "stroke adjustment in motion" feature as an optional extra.

The pump features Vane Guide check valves with immediate cut off, interchangeable high-efficiency measuring cylinder, full-size reduction gears and two types of fluid-end construction for handling various liquids.

Five cylinder sizes are available for pumping capacities from 0.7-102 gph for discharge pressures up to 1100 psig. Accuracy of the Adjust-O-Feeder is plus or minus one per cent of the set rate over a 15:1 range. *B-I-F Industries Inc.*

Circle No. 22 on Readers' Service Card

Plastic pipe fittings

A complete line of full-flow molded plastic pipe fittings with grooved ends, for quick-jointing with the company's mechanical couplings, is now available. Molded in sizes from 1½-8 in., they are available in three materials — regular polyethylene, special high-temperature, linear polyethylene and polypropylene.

Although light in weight, they can absorb shocks, blows and general on the job abuse because the material is inherently resilient. The smooth internal finish minimizes flow friction and adherence of deposits. Long life and low cost are other advantages claimed for the plastic system. *Victaulic Co. of America.*

Circle No. 23 on Readers' Service Card

Glassed-steel reactor

A 7,150 gal., glassed-steel, agitated reactor, for use in highly-corrosive environments, has been produced. According to the company, this 120-in. O. D. × 166-in. high vessel is the largest ever manufactured.

The "high" chemical quality of the interior glass permits process flexibility, easy cleaning, product purity, operating economy and resistance to product adherence.

Glassed-steel vessels of this size are custom made. *Pfaudler Co.*

Circle No. 24 on Readers' Service Card

Pumps

New pumps, known as Peerless Type A, are in production. They are applicable to the widest variety of pumping jobs as handling water and other liquids, even where a modest amount of non-abrasive solids are in suspension.

The pumps can deliver up to 70,000 gpm, permit pumping against heads up to 400 ft. and can handle, with modification, liquids with temperatures of up to 300°F.

Horizontal split-case designing allows easy maintenance and inspection. Oversize shafts, heavy-duty ball bearings, modern design wear rings and shaft sleeves all contribute to ample protection against wear, provide high safety factors in operation, as-

Photo by Ewing Galloway, N.Y.

HAM FELTZ says:

"Reminds me of HAMILTON Felts... they last a long time, too!"

"You ever see those giant redwood trees
out in California? They last
years longer than other trees!
Reminds me of Hamilton Felts.
They, too, last a long, long time.
Save you money by cutting downtime."

If one of our present 300 proven styles
won't solve your specific problem,
we will be happy to save *you* money, too,
by designing a Hamilton Felt
that will do everything you wish it to do.
Just ask your Hamilton Felt Service Salesman
— or write Shuler & Benninghofen — today.

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FELTS

SHULER & BENNINGHOFEN, HAMILTON, OHIO

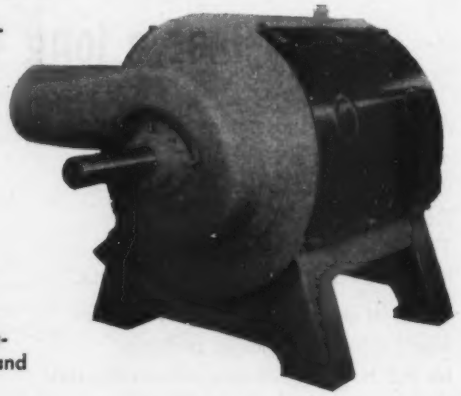
NEW ADVANCES IN LOW COST QUALITY PULP SCREENING

IMPCO CENTRIFUGAL SCREENS FOR:

Washed Stock Screening
Hot Stock Screening
Sealed Black Liquor Knotting
Fibre Length Classification
Paper Stock Cleaning

The new Impco Centrifugal Pulp Screen is the latest example of the progress made toward the ultimate in low cost quality screening. This screen incorporates many improved principles and features such as:

- — a stock inlet allowing direct top, bottom, front or rear infeeding which simplifies installation piping;
- — a tangential inlet which changes flow direction from linear to rotating, yet retains velocity head;
- — a special stator which provides uniform internal distribution of pulp;
- — a patented high-efficiency rotor which increases capacity without additional horsepower;*
- — a bottom accepted stock outlet permitting all sub-floor piping;
- — a full length quick-opening door for routine accepted stock sampling;
- — an accessible rejects outlet for tailings inspection or sampling.



These features are resulting in peak capacities and high discharge consistencies at lowest horsepowers. Reject richness is readily controlled. Engineered simplicity is characteristic of the entire line of Impco Centrifugal Screens which require very little operating attention and mechanical maintenance.

* U. S. Patent No. 2,845,848.

IMPROVED MACHINERY INC.

NASHUA, NEW HAMPSHIRE

IMPCO®

In Canada, Sherbrooke Machineries Ltd., Sherbrooke, Quebec

New Products . . .

sure reliable service and extended pump life. *Peerless Pump Div., Food Machinery & Chemical Corp.*

Circle No. 25 on Readers' Service Card

Spherical roller bearings

New spherical roller bearings have been developed. Combining three new design features—maximum diameter and quantity of convex rollers for each bearing size; precision-machined, centrifugally-cast bronze retainers; and high, heavy inner race shoulders, these components are in optimum balance to assure long carefree bearing performance on the severest installations.

The new spherical bearings have been introduced in series 22200 and 22300, in bore sizes ranging from 1.5748- to 11.0236-in. They have dynamic load bearings of up to 228,000 lbs. The bearings are available in pillow blocks with bore sizes ranging from 1-7/16- to 10-in. *Link-Belt Co.*

Circle No. 26 on Readers' Service Card

Plastic paper coatings

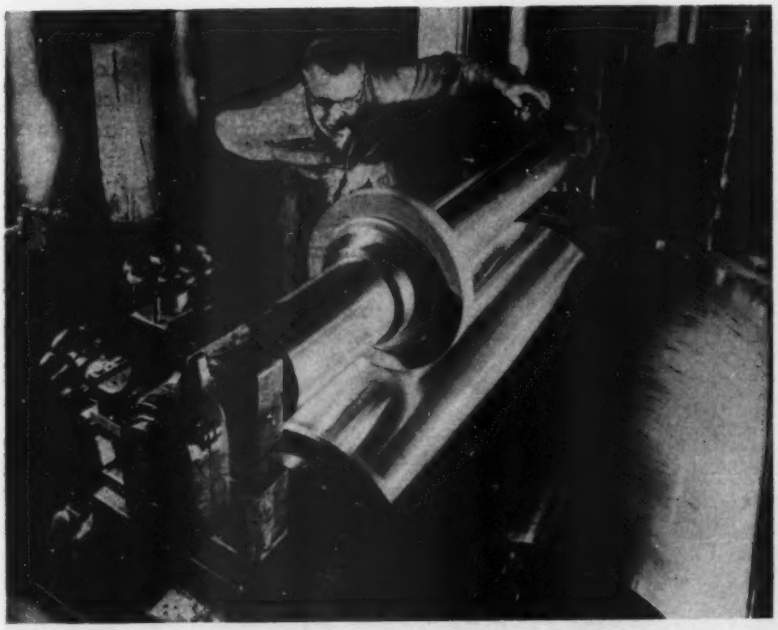
The first quart-size paper milk container made with a polyethylene coating inside and outside has been introduced. The new carton has no wax coating of any type.

Preliminary reports show that this extrusion-coated carton virtually eliminates the leakage problem. It also cannot flake or rub off, and it is resistant to water, grease and food acids.

The outer coating, called Alathon, is scuff-resistant and flexible. Brand identification can be easily printed on this polyethylene.

According to the users, this odorless, tasteless coating enables shipping over great distances. Reception by retailers and consumers has been reportedly excellent. *E. I. du Pont de Nemours & Co.*

Circle No. 27 on Readers' Service Card

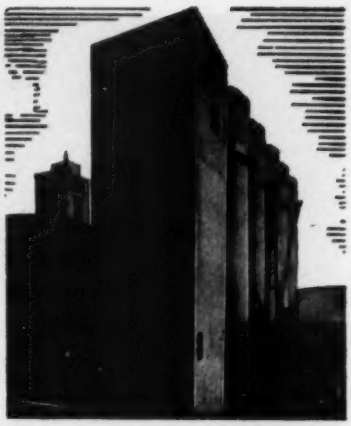


Portable roll grinder

Close tolerance roll grinding can now be more easily accomplished by this grinder right in the mill. It is stated that the unit redresses to within .00045 on roundness and straightness.

The grinder pictured above is now in use at a mill and has been said to eliminate the laborious and time consuming old method of grinding. *B. S. Roy & Son Co.*

Circle No. 28 on Readers' Service Card



Save Man Hours

Equip Your Digester House with a

HUMPHREY

Employee's Manlift

ELEVATOR

Eliminate stair climbing — save time — reduce employee fatigue. The endless belt provides continuous up and down transportation to and from sampling and operating floors. Easy and safe to operate with ready-at-hand stop and go controls and the exclusive Humphrey Safety Features.

Can be Installed in any Multi-Floor Building

Send us your requirements . . . we'll furnish complete information and prices.

HUMPHREY ELEVATOR COMPANY

Inc.

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Faribault, Minnesota

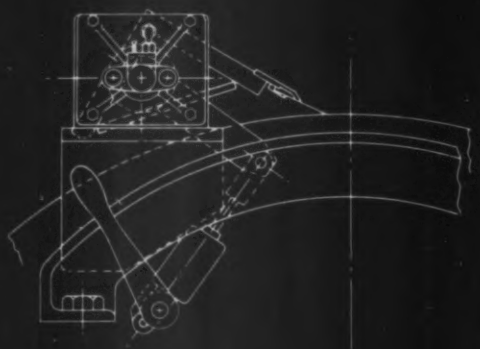
Humphrey is the original Manlift Elevator, made continuously since 1887.

No wonder– they're Lodding Doctors!

DRYER ROLLS at the Chillicothe Paper Company run clean — free of the insulation that baked-on fibers create. This contributes to operating efficiency in the dryer section, resulting in high quality, economical, safe production. Lodding Doctors are largely responsible. Other rolls at Chillicothe run clean, too, and for the same reason.

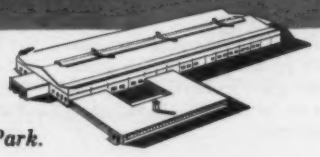
Whether for the dryers or any other rolls from the Fourdrinier to the reel, Lodding Doctors contribute to operating efficiency by helping to keep rolls clean and preventing wraps.

You can depend upon this kind of performance with Lodding Doctors, because each is custom engineered for the specific roll on which it is to be installed and is made by specialists according to the highest standards of precision craftsmanship. This is why Lodding Doctors are guaranteed to give satisfactory performance.



For the assurance of maximum doctoring efficiency on your machine rolls, specify Lodding Doctors.

LODDING
Engineering Corporation
AUBURN, MASSACHUSETTS



We welcome your inspection of our new plant located in Worcester's Auburn Industrial Park.

NEW LITERATURE

Books

LAMINATED PLASTICS. Written by D. J. Duffin. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22. Pages: 254. Price: $5.75.

The author presents a thorough survey of the production, fabrication and applications of high- and low-pressure laminates. Covered in the book are the various types and grades of raw materials and resins used, and their physical characteristics. Numerous photographs and tables of chemical, mechanical and electrical properties, related to various kinds of industrial and consumer applications, are also included.

All information and illustrations, gathered from numerous sources with the cooperation of many manufacturers, makes this book highly informative and practical. The appendix contains "a most comprehensive and accurate" list of laminated plastics manufacturers and trade names.

THE LENGTHENED SHADOW OF ONE MAN. By William Bond Wheelright and Summer Kean. Published by Crocker Burbank & Co. Association, Fitchburg, Mass. Pages: 181.

This is a history of the Crocker Burbank & Co. Association, from the days it was founded by Alvah Crocker in 1826 through 1956.

The book describes the strong family feeling that has always existed in the company between management and labor from the time it began as a small hand paper mill to the present time.

Booklets

SIMPLIFIED PRACTICE RECOMMENDATION R44-36, BOXBOARD THICKNESS is the title of a booklet prepared by the U. S. Dept. of Commerce. It is now being circulated for approval to producers, convertors, distributors and users of folding and set-up boxes made from boxboard. This revision was recommended by the National Paper Board Association in order to bring the booklet in line with the association's "Boxboard Standards" issued in May 1958. The suggested revisions were circulated to representative producers, and include changes in the caliper and weights of board, as well as additional calipers of board, changes in descriptions of products and the elimination of the one gage list. Copies of this proposed revision can be obtained by writing to C. G. Hemmer, Commodity Standards Div., U. S. Dept. of Commerce, Washington 25, D. C.

QUESTIONS AND ANSWERS ON ELECTRON MICROSCOPES is the title of a new 12-page booklet compiled from actual field queries and in sessions at the Norelco Microscope School. The booklet discusses magnification, resolution, specimen preparation, fields of application, shadow casting, electron diffraction, camera work, stereo techniques, astigmatism correction, lens details, beam wobbler, thorough-focus control and many other technical matters. Copies of this booklet may be obtained by writing to the Instruments Div., Philips Electronics Inc., 750 S. Fulton Ave., Mt. Vernon, N. Y.

USDA Reports

TECHNICAL NOTES. Here is a listing of three Technical Notes that are now available. No. 543—"Control of the European Pine Shoot Moth with Concentrated DDT Sprays"; No. 544—"Forest Plantings in Northern Lower Michigan by County", and No. 545—"Forest Area in Michigan Counties". Copies are available by writing to M. B. Dickerman, director, Lake States Forest Experiment Station, U. S. Department of Agriculture, St. Paul 1, Minn.

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

Facilities presentation

Pfaudler Permuitit Inc. has published a, Presentation of Facilities, booklet to inform governmental and business interests of the nature and extent of the company's personnel and physical facilities that are available. This highly-illustrated, 24-page booklet includes textual and pictorial descriptions of Pfaudler's four factories in the United States and five foreign divisions. It is divided into five sections: research facilities, engineering facilities, manufacturing facilities, project planning and applications development.

Circle No. 29 on Readers' Service Card

Roll finishing system

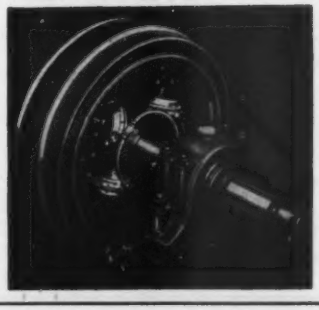
Lamb-Grays Harbor Co. Inc. has published an eight-page color folder to explain its roll finishing system. The new folder features a 34-in. long, foldout diagram of a typical Lamb roll finishing system.

Circle No. 30 on Readers' Service Card

Morden catalog

Morden Machines Co. announces that four new insertion pages of its catalog have been printed. They describe the company's new laboratory (4.25" diameter rotor) Slush Maker, used for defibering dry pulps and all types of broke and paper, including wet strength, and also used for secondary purposes as mixing chemicals

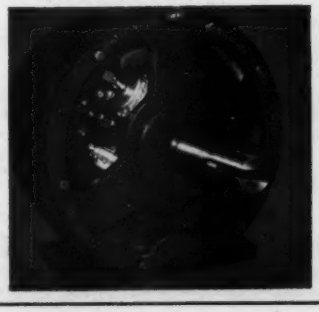
STOP TELESCOPING ROLLS • MUSHROOMING CORES



Use HORTON Clutches and Brakes to control the sheet tension on your center winders and back stands. Take the guess work out of tensioning and let Horton equipment give you uniform good rolls all the time.

VARIABLE SPEED CLUTCH PULLEYS
GOVERNOR CONTROLLED BRAKES

HORTON MFG. CO., INC.
MINNEAPOLIS 14, MINNESOTA



PUT ACTION IN YOUR SAFETY PROGRAM

Add a touch of showmanship to your safety program. Films let you tell your training story with the dramatic impact of pictures . . . action . . . sound. You can cut your safety training in half, give fewer refresher courses and get better results by using training films.

Here are three film sets that will help you arouse and keep alive interest in your safety program. And there is no better way to teach foremen how to be better supervisors.

SPEAKING OF SAFETY

A brand new set of films that will teach your foremen and supervisors the tips they should know about making safety talks, and how to transmit management's ideas and plans. Six 35mm sound slidefilms and leader's manual in an attractive leatherette case.

HUMAN FACTORS IN SAFETY

This is a series of six 35mm sound slidefilms with leader's manual that may be used for an advanced safety course. Each film deals with one aspect of the complex art of handling people. Collectively, the films show how to train workers, how to keep experienced people on their toes and how to win respect, cooperation and loyal support.

SAFETY MANAGEMENT FOR FOREMEN

A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

Write for complete information and details to the

NATIONAL SAFETY COUNCIL

425 North Michigan Ave., Chicago 11, Illinois

New Literature . . .

and dyes; the Stock Maker, a high-speed, vertical-type unit, used for treating pulp samples for production control, especially in integrated mills, and the No. 4 Stock Maker, designed for smaller, low-tonnage mills.

Circle No. 31 on Readers' Service Card

Pressure elements

Fischer & Porter Co.'s new eight-page technical bulletin describing its complete line of pressure elements, including bellows, bourdon tube and liquid-filled types, is now available. The bulletin gives specifications on elements suitable for pressure ranges between the limits of 30-in. hg. vacuum and 5000 psig and lists ranges for the various types in different applications.

Circle No. 32 on Readers' Service Card

Lightweight pipe

Naylor Pipe Co. has just published a condensed catalog, describing its complete line of pipes, fittings, flanges and connections. It also contains ordering information and information on their application in various industries presented in concise form.

Circle No. 33 on Readers' Service Card

Steel strapping

Acme Steel Co., in a new Ideas-In-Action report, explains how a paper company provides damage-free shipment of kraft paper rolls. By using heavy-duty steel strapping for braces, the rolls are securely kept in one position during transit. A loading diagram and a step by step description of the loading and bracing operations are included in the report.

Circle No. 34 on Readers' Service Card

Condenser and ejector combinations

Southwestern Engineering Co.'s illustrated bulletin describes its new line of Sweco All-in-One condenser and ejector combinations used in producing vacuum with small steam turbines.

Circle No. 35 on Readers' Service Card

Photographic work

Appleton Woolen Mills has announced that its bulletin, which discusses the use of photographic work sampling to lower labor costs, improve quality and increase production, is now available. The bulletin contains case histories and describes cost-cutting techniques in full detail.

Circle No. 36 on Readers' Service Card

Vertical conveyor

Lamson Corp. has issued a new four-page bulletin describing the Combing Vertical Conveyor used for typing together horizontal floor conveyors in a multi-story building into integrated system.

Circle No. 37 on Readers' Service Card

Dust collectors

Wheelabrator Corp. is offering a 24-page illustrated handbook that describes a wide range of industrial dust- and fume-producing processes that can be successfully controlled with the properly designed cloth or glass bag-type dust collectors. The company's Dustube collectors, that operate at low cost, are fully illustrated and explained.

Circle No. 38 on Readers' Service Card

Paper specimens

Riegel Paper Corp. has published a new portfolio demonstrating the printing characteristics of its four new Carolina merchant grades of paper—White Tag, Manila Tag, Vellum Bristol and White Index. They all feature brightness, cleanliness, smoothness, even formation and they are especially made for budget printing. The portfolio contains 11 printing samples on the Carolina grades, together with a sample book for each grade.

Circle No. 39 on Readers' Service Card

Nitrocellulose solutions

Cellofilm Industries Inc. has released a new brochure describing some of its nitrocellulose and vinyl solutions. Included are typical formulations of solutions adapted for paper coaters.

Circle No. 40 on Readers' Service Card

Slitter-winders

Dilts Div., Black-Clawson Co. Inc. has released a bulletin describing the newly-improved features of its line of slitter-winders. The advantages of using the company's Rollflyte mill winders and TD series of converting rewinders are also discussed.

Circle No. 41 on Readers' Service Card

Knife cutters

Sprout, Waldron & Co. Inc. has made available a specifications and data sheet providing design details of the various Sprout-Waldron knife cutters. This bulletin traces the history of knife cutter development from the original corn cutter to the latest heavy-duty industrial units.

Circle No. 42 on Readers' Service Card

The Paper Industry Professional and Business Services

J. E. SIRRINE COMPANY
ENGINEERS Since 1902
GREENVILLE, SOUTH CAROLINA

Design — Consultations
Paper & Pulp — Reports
Water & Waste — Appraisals
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PROJECT ENGINEER

Our expanding Engineering Department has an outstanding opportunity for an experienced man. The opening requires a man who has a degree in Mechanical Engineering or equivalent. He must have 3 to 5 years paper mill experience or 7 to 8 years experience in the manufacture of paper mill machinery. He must be a man who can step in and assume responsibility for process studies, design and development work.

Salary open. Excellent Benefit Program plus successful Profit Sharing Plan available. Your inquiry, with detailed resume and salary requirements, will receive immediate and confidential attention. Write

Mr. John A. Burton,
Personnel Manager
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Windsor Locks, Connecticut

CLASSIFIED ADVERTISING

WANTED

PERSONNEL, INDUSTRIAL AND PUBLIC RELATIONS MANAGER for pulp and paper company which is building a 500-ton per day average kraft pulp and linerboard mill to be located at Counce, Tennessee. Among qualifications required are: Thorough knowledge and extensive experience in personnel and industrial relations work from Southern kraft pulp and paper industry; age between 35 and 50; should be well informed about labor organizations and negotiations. Will report directly to local officer in charge of complete operation. Position has excellent growth opportunities. Applications will be treated confidential. Only well qualified applicants will be considered.

TENNESSEE RIVER PULP & PAPER COMPANY
230 Park Avenue, New York 17, New York

TECHNICAL SUPERINTENDENT

Midwestern nine point semi-chemical mill needs an experienced and technically qualified supervisor for mill process control and laboratory direction. Graduate engineer over twenty-eight years preferred. Future opportunity unrestricted. Submit resume and salary expected to Box 675, The PAPER INDUSTRY.

WANTED — MECHANICAL DESIGN ENGINEERS

for central engineering department of large manufacturing plant. Men preferred with experience in pulp, paper or hardboard industry. Work involves general engineering, power plant, piping layouts, automatic product handling, processing equipment design and board work. Excellent opportunity for men of exceptional ability. Should have engineering degree or equivalent. Give complete information including salary range with application. Our employees know of this advertisment. Location south. Address replies to Box 676, The Paper Industry.

CHARLES P. RAYMOND SERVICE, Inc.

Confidential Employment Service for employers seeking executives and executives seeking positions. We welcome your inquiries.
294 Washington Street LIberty 2-6547 Boston 8, Mass

NEW SLIMICIDE

(tributyl tin oxide complex)

Agents wanted to handle this new slime killer priced at $2.40 per lb. Every mill who have tried this unique material are now regular users. Paper mill personnel may act as agents in spare time. Inquiries will be held confidential. Write Box 672, The Paper Industry.

CLEANING EQUIPMENT

—for plant maintenance and tank cleaning, hot "jet-stream" cleaning with Sellers Hydraulic Jets. Send for Bulletin 424-B, Sellers Injector Corp., 1603-J Hamilton Street, Philadelphia 30, Pa.

BOARD MILL CHEMIST — Married, with family. Available immediately. Experienced in mill operations, furnishes, refining, color matching, coatings, printing, new product development and quality control. Write Box 673, The Paper Industry.

Eight Publications for Papermakers

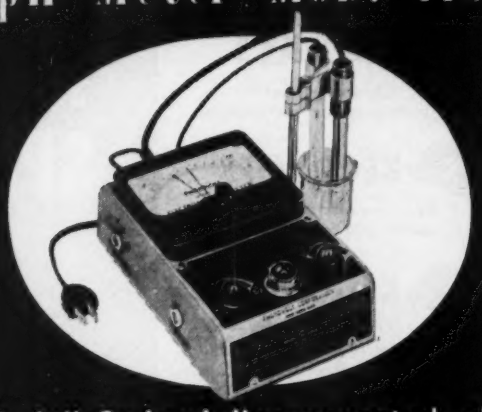
Pulp and Paper, Volume 1 (Casey)	$18.00
Pulp and Paper, Volume II (Casey)	18.00
Paper and Paperboard Making (Williamson)	6.00
Technology of Paper Coating	2.00
Lessons in Papermaking—Part 1	1.50
Lessons in Papermaking—Part 2	1.50
Notes and Observations on Beaters	1.00
Trouble on the Paper Machine	.75

Mail your order with payment to:

The PAPER INDUSTRY

431 S. Dearborn Street, Chicago 5, Illinois

PHOTOVOLT
pH Meter MOD. 115



A full-fledged line-operated pH Meter of remarkable accuracy at the unprecedented price of $145.-
complete incl. electrodes

Write for bulletin #225 to

PHOTOVOLT CORP.
95 MADISON AVE NEW YORK 16, N. Y.

NOW THERE IS A *NEW IMPROVED* SLOTTED END OF GRAIN

SUCTION BOX COVER

The characteristics of end grain Maple naturally provide a smooth, even, long wearing surface. Laminated plastic cross members support the Maple end grain lands. LOVAC construction eliminates sag.

Check these features

★ ELIMINATES STREAKING
★ LESS PINHOLES
★ LESSENS CLOGGING
★ GIVES LONGER WIRE LIFE
★ EVEN VACUUM
★ BETTER FIBRE FORMATION
★ BETTER TENSILE STRENGTH

MADE BY THE MANUFACTURER OF RES-LIN AND MET-AL-RIB SUCTION BOX COVERS

Write for nearest representative, data sheet and literature.

APPLETON WOOD PRODUCTS CO. APPLETON · WISCONSIN

KEOGELS
Pregelatinized—ready to use —beater starches.

KEOTACS
Cationic—effective— economical wet end additives.

KEOZYMES
Enzyme converting starches for sizing and coating adhesives.

KEOCLORS
Oxidized starches— complete line for sizing and coating adhesive application.

KEOGUMS
New line of corn starch derivatives for sizing and coating adhesive application.

KEOFILMS
Economical—controlled viscosity thinboiling starches for special sizing applications.

There's More to Buying Starch than Getting a Good Product...

TO IMPROVE QUALITY SPECIFY...

OK BRAND

STARCHES ...for every Paper Mill Operation!

TO LOWER COSTS...
call on Hubinger Technical Service. You can depend upon our laboratory facilities and trained field personnel to supply the best and most economical solution to your starch and adhesive problems.

There are OK BRAND products—made especially for every paper mill operation that calls for starches and adhesives. Best of all, there is no extra tariff on any of these top-quality Hubinger items. If your mill needs special starch products to meet improved quality or strength specifications, let our nearest paper-starch technical service representative study your needs. He is prepared to quickly offer valuable aid. Just phone or wire us.

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HUBINGER 78 YEARS

MARKET QUOTATIONS

RAGS (Domestic)

New Cotton Cuttings

The following are brokers' and large dealers' average buying prices for sizeable lots in cents per pound f.o.b. New York:

	per cwt.	
No. 1 white shirt cuttings	13.00—	13.50
Soft unbleached muslins	15.50—	16.00
Fancy shirt cuttings	4.50—	5.00
No. 1 percales	5.50—	6.00
No. 1 washables	2.25—	2.50
No. 1 light silesias	6.50—	7.00
No. 1 light prints	4.75—	5.00
Light flannelettes	6.50—	7.00
Cottonades	2.75—	3.25
Blue overall cuttings	6.75—	7.25
Blue cheviots	6.75—	7.25
Canton flannels, bleached	10.50—	11.00
Canton flannels, unbleached	10.50—	11.00
Osnaburg cuttings	9.50—	10.50
Underwear cuts, bleached	14.50—	15.00
Underwear cuts, unbleached	14.50—	15.00
Sun tan khaki cuttings	5.00—	5.50
American linen cuttings	6.75—	7.25

Cotton Rags

The following are prices, cents per pound, paid by dealers and brokers f.o.b. New York:

	per cwt.	
No. 1 roofing (Chicago)	.90—	.95
No. 2 roofing (Chicago	.70—	.75
Twos and blues, repacked	1.50—	1.75
Thirds and blues, repacked	1.50—	1.75
No. 1 whites, repacked	—	
No. 1 whites miscellaneous	—	
No. 2 whites, repacked	—	
No. 2 whites, miscellaneous	—	

RAGS (Foreign)

(ex dock New York City)

New Rags

per cwt.

Nominal:
- New dark cuttings
- New mixed cuttings
- New light silesias
- Light flannelettes
- Unbleached cuttings
- New white cuttings
- New light oxfords
- New light prints

Old Rags

per cwt.

Nominal:
- No. 1 white linens
- No. 2 white linens
- No. 3 white linens
- No. 4 white linens
- No. 1 white cottons
- No. 2 white cottons
- No. 3 white cottons
- No. 4 white cottons
- Extra light prints
- Ordinary light prints
- Medium light prints
- Dutch blue cottons
- French blue cottons
- French blue linens
- Checks and blues
- Linsey garments
- Dark cottons
- Old shopperies

ROPE and BAGGING

F.o.b. and ex dock New York City

Gunny No. 1, domestic	—
Gunny No. 1, foreign	—
No. 1 manila rope, domestic	—
No. 1 manila rope, foreign	—
New burlap cuts (soft)	—
Sisal strings	—
Mixed strings	—

WASTE PAPER

The following are prices, dollars per net ton, paid by brokers and large dealers for carload quantities of baled stock, f.o.b. cars New York:

No. 1 hard white envelope cuttings	90.00—	95.00
No. 1 hard white shavings	75.00—	80.00
No. 1 soft white shavings	50.00—	55.00
Soft white shavings, uncoated	50.00—	55.00
Fly leaf shavings No. 1	25.00—	27.50
Fly leaf, woody, No. 1	23.00—	25.00
Mixed colored shavings	21.00—	23.00
No. 1 books and magazines	22.00—	23.00
Ledger stock, white, No. 1	50.00—	52.50
Ledger stock colored, No. 1 (Midwest ship)	30.00—	
New manila envelope cuttings (free of groundwood)	60.00—	65.00
New manila envelope cuttings (containing groundwood)	50.00—	55.00
Manila tab cards	75.00—	80.00
Colored tab cards	50.00—	55.00
New northern kraft envelope cuttings	60.00—	65.00
Triple sorted kraft, 100%	30.00—	35.00
No. 1 old kraft	30.00—	
White news cuts, No. 1	55.00—	60.00
No. 1 overissue news	20.00—	22.00
Folded news, special	18.00—	19.00
Folded news, ordinary	16.00—	17.00
Old corrugated boxes	22.00—	23.00
New jute corrugated cuts	19.00—	20.00
Mill wrappers	11.00—	13.00
Boxboard cuttings	7.00—	9.00
No. 1 mixed paper	7.00—	9.00

CHEMICALS

F.o.b. New York City

Alum, ammonium		
Granular, bags, works, cwt.	4.30—	
Lump, drums, works, cwt.	5.05—	
Powdered, drums, works, cwt.	5.20—	
1-Arginine, drums, kilo	90.00—	
Blanc Fixe		
Direct process, bags, c.l., works, ton	145.00—	
L. c. l., ton	155.00—	
Bleaching Powder, drums, cwt.	—	
Casein, domestic acid precipitated		
30-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.56—	
80-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.64—	
China Clay, domestic dry-ground, airfloat, 99%		
325-mesh bags, c.l., Georgia works, ton	10.00—	12.00
300-mesh bags, c.l., Georgia works, ton	13.50—	14.50
Imported, white, lump, bulk, c. i., ex dock Phila, Portland, Me., gross ton	20.00—	.35.00
Chlorine, liquid		
Tanks, single units, works, freight equaled, cwt.	3.15—	
Glycerine, refined (CP, USP) 98%, drums c. l., delivered lb.	.29⅜—	
Litharge, commercial powdered		
Barrels, c. l., works, freight equaled lb	.12¾—	
Rosin, gum, c. l., f.o.b. New York, cwt.		
K, M	9.75—	
N	8.90—	
WG	9.85—	
WW	10.40—	
Rosin, wood, c. l., f.o.b., shipping point, cwt.		
K, M	8.20—	
N	8.40—	8.60
WG	8.75—	
WW	9.20—	
Saltcake, domestic, bulk works, 100% Na_2SO_4 basis ton	28.00—	
Soda Ash		
Dense, 58%, paper bags, c.l. works, cwt	1.90—	
Light, 58%, paper bags, c.l. works, cwt	1.85—	
Soda, caustic		
Flake, 76%, drums, c. l. works, freight equalled, cwt	5.20—	
Solid, 76%, drums, c. l. works, cwt.	4.80—	
Sodium Silicate		
40°Be, 1:3.2, turbid, drums, c. l., works, cwt.	1.55—	
52°Be, turbid, 1:2.4, drums, c. l., works, cwt.	2.65—	
Starch		
Pearl, 140-lb. bags, cwt.	7.51—	
Pearl, 100-lb. bags, cwt.	7.36—	
Powdered, 100-lb. paper bags, cwt.	7.48—	
Sulfur, crude		
Bulk, c. l. mine, contract, long ton	23.50—	
Talc		
Domestic, fibrous, N. Y., grd., bags, c. l. works, ton	28.00—	
Canadian, ground, bags, c. l. works, ton	20.00—	35.00
Titanium Pigment		
Calcium-rutile base, regular, bags, c. l., lb.	.09⅜—	
High-tinting, drums, c. l., lb.	.14⅜—	
Zinc Oxide Pigment, American process		
Lead-free, bags, c. l. freight allowed, lb.	.14½—	
Leaded, 35%, bags, c. l., freight allowed, lb.	.15⅛—	

WOOD PULP

Quotations on domestic and Canadian pulp, dollars per short air-dry ton delivered consuming mills including basic allowances, follow:

Bleached sulfite, No. 1	155.00—
Bleached sulfite, Canadian	155.00—
Unbleached sulfite	135.00—
Unbleached sulfite, Canadian	135.00—
Bleached soda	150.00—
Bleached soda, Canadian	150.00—
Kraft, bleached hardwood	152.00—
Kraft, bleached	157.00—
Kraft, bleached southern	160.00—
Kraft, bleached Canadian	160.00—167.50
Kraft, unbleached southern	120.00—
Kraft, unbleached, Far West	125.00—
Kraft, unbleached Canadian eastern	135.00—
Kraft, unbleached Canadian western	120.00—125.00
Kraft, semi-bleached southern	140.00—
Sulfite screenings	—
Sulfate screenings	—

Quotations on imported wood pulp, dollars per short air-dry ton on dock American Atlantic ports, follow:

Bleached sulfite, Swedish, freight allowed	155.00—
Bleached sulfite, Norwegian, del'd with limited freight allowance	155.00—
Bleached sulfite, Finnish, freight allowed	155.00—
Unbleached sulfite, Swedish, freight allowed	135.00—
Unbleached sulfite, Finnish, freight allowed	135.00—
Kraft, unbleached, Swedish, freight allowed	125.00—
Kraft, unbleached, Finnish, freight allowed	125.00—
Kraft, bleached, Swedish, on dock	157.50—162.50
Kraft, bleached, Norwegian	155.00—

PAPER

Quotations are mill quotations Chicago

Boards (prices per ton, delivered in Chicago, 10 tons or more):	
Plain chip	107.50
News vat lined chip	110.00
.009 chip, rolls	100.00
Filled news	111.50
Solid news	114.50
White vat lined chip	144.50
Chip tube and can stock	112.50
Single manila lined chip	162.50
Single jute lined chip	147.50
Container, 42-lb.	
Kraft liner (per 1000 sq. ft.)	2.68
White patent coated	
.020	175.00
.018	177.50
.016	182.50

Book Paper (f.o.b. Chicago, c.l. cases per cwt):		
No. 1 enamels		20.05
No. 2 enamels		19.05
Machine-coated, 45- to 100-lb.	15.05—	18.50
60-lb. + uncoated offset, 25 × 38 (2000 lb.)		17.05
"A" grade English finish untrimmed, 25 × 38 (2000 lb.)		16.15

Rag Content Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):

	per cwt
100% rag	64.70
75% "	49.65
50% "	37.80
25% "	31.90

Rag Content Ledger (white, 5000 to 10,000 lb., ream sealed cartons):

100% rag	65.85
75% "	50.80
50% "	39.00
25% "	33.10

Sulfite Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):

No. 1	22.50
No. 2	21.75
No. 4	20.35

Sulfite Ledger (white, 5000 to 10,000-lb., ream sealed cartons):

No. 1	23.70
No. 2	22.95
No. 4	21.55

Newsprint (contract base price)	per ton
Rolls, standard	135.00
Sheets	Standard differentials

Kraft Wrapping — Natural (standard rolls 9- and 15-in. diam.)

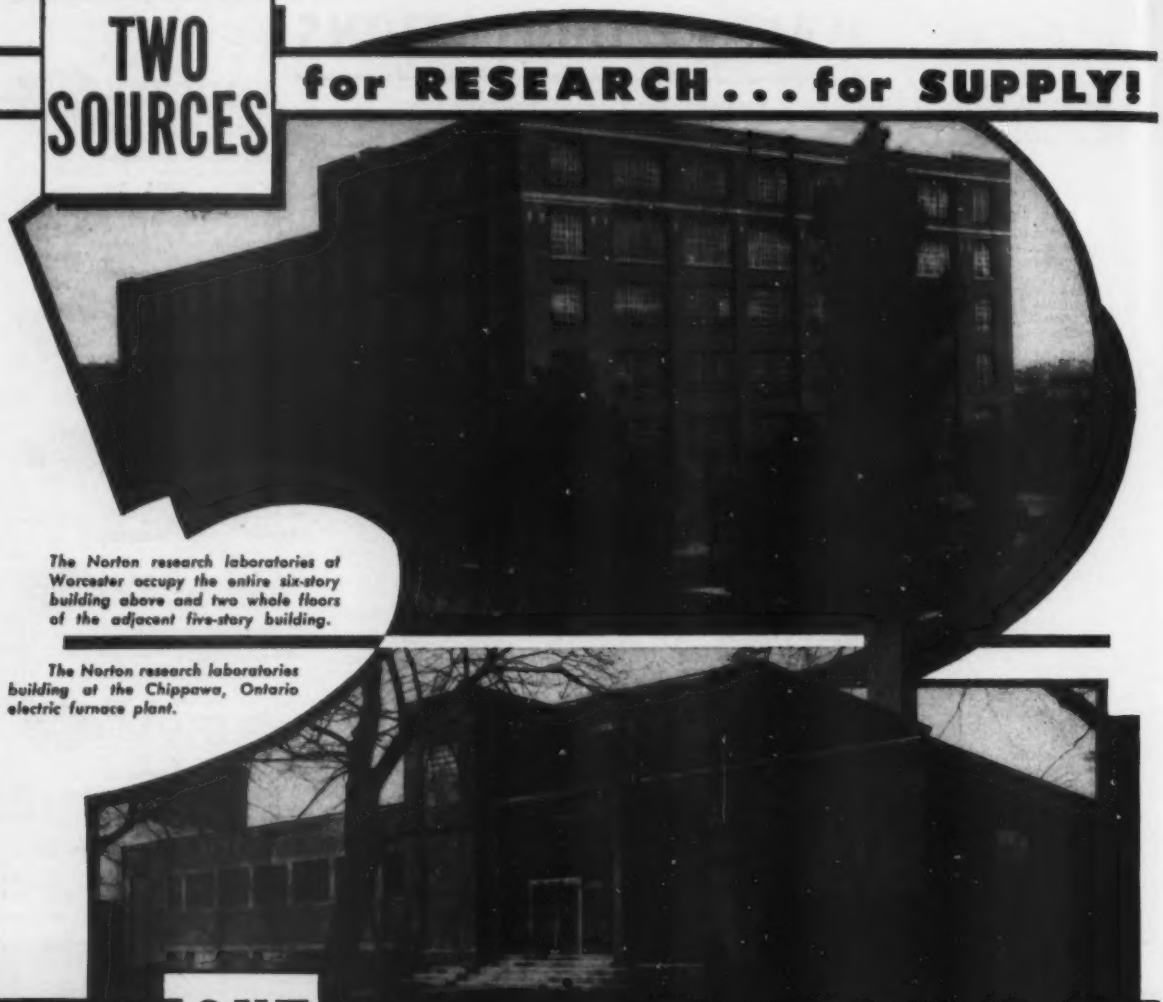
	per cwt
70-lb. and heavier	8.50
60-lb.	8.75
50-lb.	9.00
40-lb.	9.25
35-lb.	9.75
30-lb.	10.50
25-lb.	11.25
20-lb.	12.25

No. 1 Kraft Butcher — Pink

	per cwt
40-lb. only	10.00

(Sheets — Plus 50c cwt)

TWO SOURCES for RESEARCH . . . for SUPPLY!



The Norton research laboratories at Worcester occupy the entire six-story building above and two whole floors of the adjacent five-story building.

The Norton research laboratories building at the Chippawa, Ontario electric furnace plant.

But only ONE standard of Quality and Service for You

In Norton Company laboratories, both in Worcester and in Chippawa, Ontario, more than 185 research men and technicians are constantly at work applying a wide variety of highly specialized knowledge to the development of better abrasives, pulpstones, grinding wheels, and other Norton products.

From the Norton manufacturing plants at Worcester and at Hamilton, Ontario, hundreds of pulpstones go out each year to meet the world's requirements for mechanical pulp.

Thus users of Norton pulpstones have the benefit of research developments from two major sources — are served by two completely independent sources of manufacture — both with one high standard of quality and service.

NORTON COMPANY, WORCESTER 6, MASS.
Norton Company of Canada Ltd., Hamilton, Ont.
EXPORT: Norton Behr-Manning Overseas Inc., Worcester 6, Mass.

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Appleton Wood Products Co. 861
Arnold, Hoffman & Co., Inc. 842
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Atkins Saw Division 834

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Bauer Bros. Co., The
Beloit Iron Works 813, 843, 847
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Buell Engineering Company
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Classified Advertising 860, 861
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Dempster Brothers 850
De Zurik Corporation 846
Diamond Power Specialty Corp. 803
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Egan & Co., Frank W. 841
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English China Clays Sales Corp. 835
EPIC, Inc.

Fairbanks, Morse & Co.
Fitchburg Screen Plate Co., Inc. 865
Foote Bros. Gear & Machine Corp.
Fritz Publications, Inc. 861

General Dyestuff Company 793
Georgia Kaolin Company

Hanchett Manufacturing Co. 844
Hart-Moisture-Meters
Heil Company, The
Horton Manufacturing Co., Inc. 859
Hubinger Company, The 862
Humphrey Elevator Company 857
Huyck Felt Co.

Improved Machinery, Inc. 856
Ingersoll-Rand

James Gear Mfg. Co., D. O.
Jenkins Sons, Inc., M. W. 840
Johnson Corporation, The 830
Jones & Sons Company, E. D. 838

Kalamazoo Tank & Silo Co. 865
Kerrigan Iron Works, Inc. 853

Ladish Co.
Lawson Company, The
Layne & Bowler, Inc. 829
Lestoil, Inc.
Lindsay Wire Weaving Co., The
Link-Belt Company
Lockport Felt Company
Lodding Engineering Corp. 858

Marathon Southern Corporation
Moisture Register Co. 849
Murray Mfg. Co., D. J.

Nash Engineering Co., The 833
National Safety Council 860
Naylor Pipe Company 852
Neff & Fry Company
Northwest Engineering Company
Norton Company 864

Oilgear Company, The 900

Paper Industry, The 861
Patton Manufacturing Co., Inc., The
Penick & Ford, Ltd., Inc.
Perkins & Son, Inc., B. F.
Photovolt Corporation 861
Planet Corporation
Poirier Control Company
Pusey & Jones Corp., The 817

Charles P. Raymond Service, Inc. 861
Rogers & Co., Samuel C.

Sandy Hill Iron and Brass Works 821
Scapa Dryers, Inc. 826
Shuler & Benninghofen 855
Signode Steel Strapping Co.
Smidth & Co., F. L. 801
Sinclair Company, The 848
Spraying Systems Co. 848
Sprout, Waldron & Co., Inc. 828
Staley Mfg. Co., A. E. 794
Standard Oil Co. (Indiana)
Stebbins Engineering & Mfgr. Co. 3rd Cover
Stickle Steam Specialties Co. 845
Sveen-Pedersen Sales Corp. 1st Cover

Tennessee Corporation
Texas Gulf Sulphur Co. 822
Torrington Company, The 802

Union Asbestos & Rubber Co.

Valley Iron Works Company
Vanderbilt Co., R. T. 796

Waterbury Felt Company 865
West Bend Equipment Corp. 854
Weyerhaeuser Timber Co.
Williams-Gray Company 844
Wolferz Alloy Equipment, E. C.

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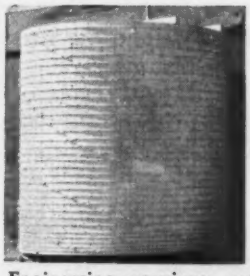

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Engineering experience, craftsmanship, selected top-grade tank lumber . . . your guarantee of satisfaction. For large tanks or small, see *Kalamazoo* first. Free estimates and suggestions.

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DEPENDABLE FELTS

The **WATERBURY** Felt Company

SKANEATELES FALLS, N. Y.

FITCHBURG "RESISTO"

Stainless Steel Screen Plates

Simple Construction:

Heavy one-piece steel plate.
One-piece Bronze "shock-absorber" grid frame.
Joined with forged-in Inconel rivets. (no welding)

Highest Capacity: Cut with our famous "DUPLEX SLOTS," giving top screening capacity.

Instantly Interchangeable: With any standard ⅜" Bronze plates either Drilled or Beveled edge.
Also available ⅝" thick for "T"-Bar installation.

FITCHBURG Screen Plate Co., Inc.

301 South St., Fitchburg, Mass.

Back view showing simple, rugged, two-piece construction.

PAPER INDUSTRY

Whither?

. . . in production, processes, new products, markets

Meteor dust — the cause of rain?

The possibility of meteor dust being a cause of rain is being studied by Australian and American scientists. The theory has been advocated by Australia's Dr. E. G. Bowen, chief of radiophysics division, that rains occur about 30 days after the earth encounters dusty trains of meteors. It is envisaged that the study of meteor dust in space will result in more accurate weather prediction.

Japanese pulp mill in Alaska

The $55,000,000 investment in a new pulp mill to be built near Sitka, Alaska, by Alaska Pulp Co., a Tokyo concern, amounts to nearly eight times the price the United States paid for Alaska in 1867. The equipment to be installed at this mill will include two 7,500 KW turbo-generators supplied by General Electric; steel tanks supplied by Chicago Bridge & Iron Works; washer and bleaching equipment by Improved Machinery, Inc.; and a pulp dryer made by Rice Barton Corporation.

Polyester fiberglass machine hood

A light-weight paper machine hood made of polyester fiberglass is now available through Mead Pulp Sales Inc. Due to its light weight, the hood is easier and more economical to install. Also, polyester fiberglass being a tough and resilient material, the new hood is able to withstand severe impacts and to resist corrosion. The hood's translucence further offers the advantage of passage of adequate light for the convenience and safety of the operators.

APPA appoints public relations committee

APPA has created a committee to develop and coordinate an industry-wide public relations program. The committee will cooperate with the public relations efforts of other related industry associations for the benefit of the public, the press and the industry as a whole. Officers of the Public Relations Committee are: William H. Chisholm, president of Oxford Paper Co., Chairman; P. H. Glatfelter, III, president P. H. Glatfelter Co., vice chairman; Theodore H. Davis, American Paper & Pulp Association, secretary.

B & W develops pressurized-furnace steam generator

The pressurized-furnace steam generator, recently developed by Babcock & Wilcox offers an advanced design in "membrane wall" prefabricated furnace construction utilizing welded tubular furnace wall panels.

The pressurized-furnace design offers such advantages as high efficiency, elimination of the induced draft fan, savings in fuel and power costs, and simplification of boiler operation. The boiler which burns either oil or gas, is available for steam pressures up to 1150 psi.

Another Stebbins First–

Insulated Ceramic-Concrete Outdoor Tanks for Sub-Freezing Climates

The tank illustrated, located near the Canadian border, has been through two winters carrying stock at 4% consistency. With no addition of heat, there has been no freezing—no adherence to the inner walls.

Perfect for outdoor storage of acids, liquor and pulp slurries in locations where extreme temperature changes are commonplace, Stebbins insulated tanks conserve heat, decrease the hazard of freezing and provide more uniform liquor and stock temperatures for operations. Cost compares with that of insulated steel, wood stave and other materials, AND—the interior surface can be of tile or brick with proper joint material for full corrosion resistance.

Conserve valuable inside space and still prevent expensive maintenance due to stock freeze-ups. Specify a Stebbins insulated tank. Complete on your foundation ready for use, with concrete cover or open for your own cover. Wooden covers can be supplied by a Stebbins subcontractor. Write for full details.

SINCE 1884
Specialists in Design Installation and Servicing of Linings and Tile Tanks

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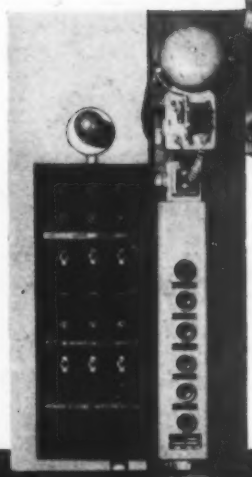
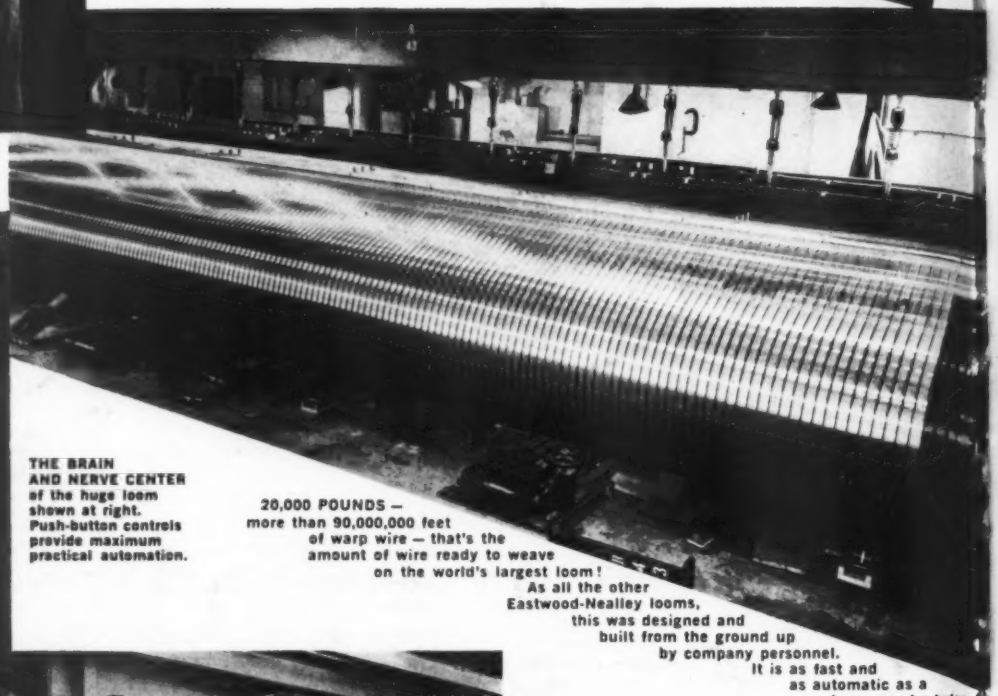
MODERNIZATION AND AUTOMATION

ELECTRONIC CONSOLE, developed by Eastwood's technicians in its entirety, is the heart of the stretching table. At a touch of a finger, giant steel rolls are maneuvered with incredible accuracy to the minutest tolerances.

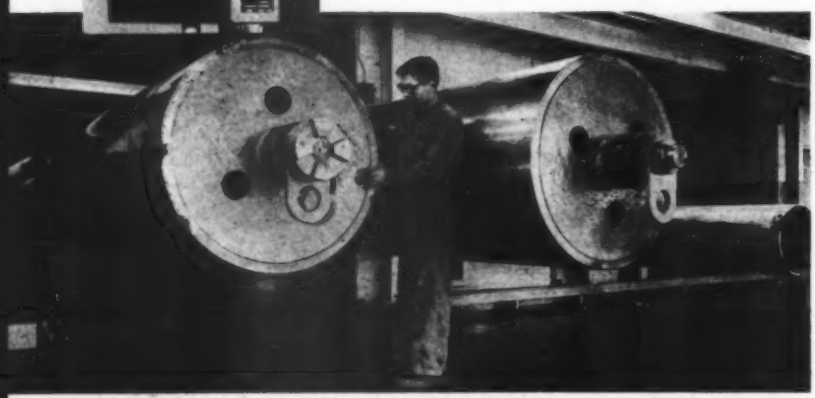
LARGEST STRETCHING TABLE IN THE WORLD. Its massive rolls will handle wires over 400 inches in width and more than 200 feet long with ease, under guidance of electronic console pictured at left.



THE BRAIN AND NERVE CENTER of the huge loom shown at right. Push-button controls provide maximum practical automation.



20,000 POUNDS — more than 90,000,000 feet of warp wire — that's the amount of wire ready to weave on the world's largest loom! As all the other Eastwood-Nealley looms, this was designed and built from the ground up by company personnel. It is as fast and as automatic as a loom can be today.



E LARGEST CENTRIFUGALLY CAST STEEL ROLLS EVER MADE....
" in diameter, over 400" wide and weigh 13 TONS each!
ovement is accomplished by Eastwood-designed carriers on which
rolls are cantilevered for placement. The axle loading on the carrier wheels
greater than the wheel loading on the heaviest locomotive. Here again,
ctronic controls provide ease of movement with pinpoint accuracy.

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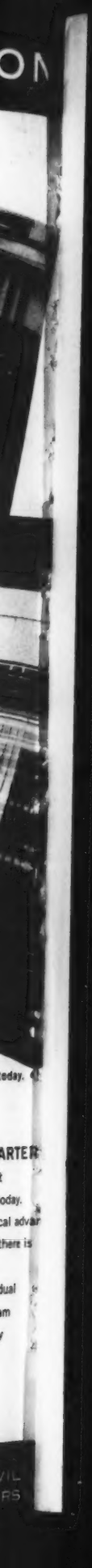
the equipment which you see here is the most electronically controlled of its kind in the world today. However, Eastwood's concentration on modern technological advar is complemented with the company's insistence that there is no substitute for care, skill and experience. Therefore, the training and seasoning of the individual receives top priority in the forward-looking program of this firm which has served the paper industry for more than 80 years.

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